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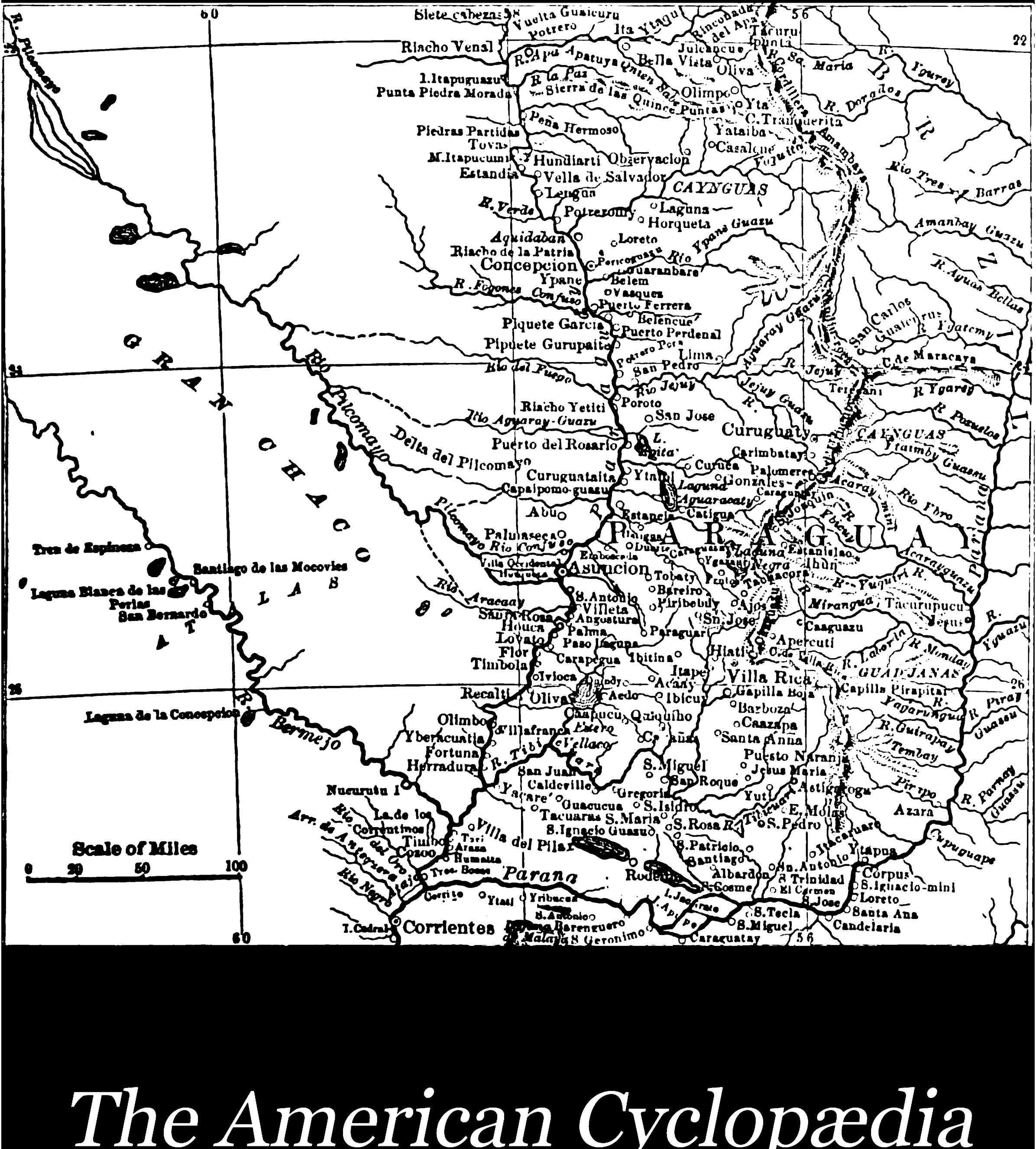

The American Cyclopædia

THE

AMERICAN CYCLOPÆDIA.

VOL. XIII.

PALESTINE—PRINTING.

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THE

AMERICAN CYCLOPÆDIA:

A

Popular Dictionary

OF

GENERAL KNOWLEDGE.

EDITED BY

GEORGE RIPLEY AND CHARLES A. DANA.

SECOND EDITION, REVISED.

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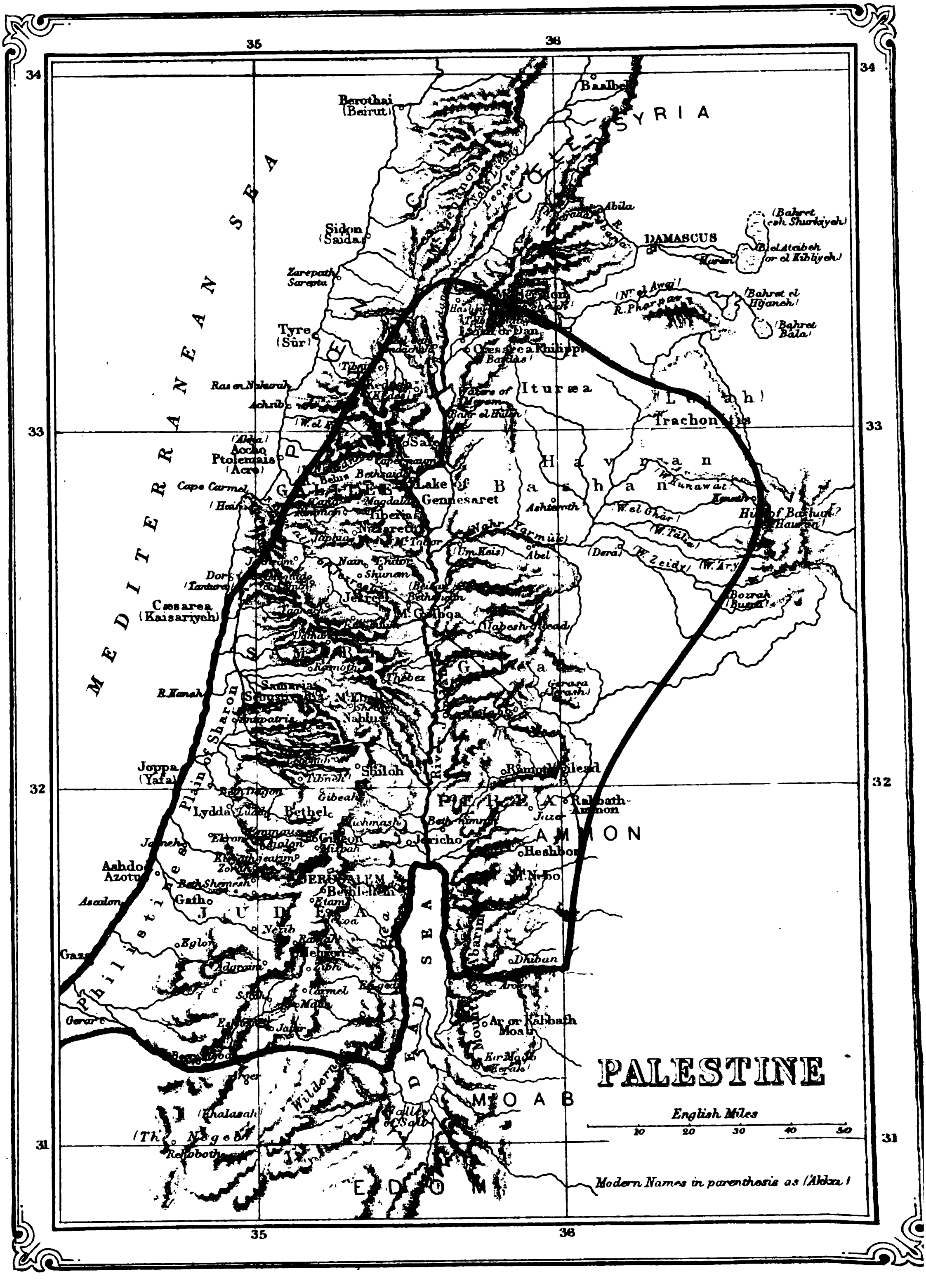
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Wilderness of Judæa
Valley of Salt
Mount Seir
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River Jordan
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THE

AMERICAN CYCLOPÆDIA.

PALESTINE (Gr. Παλαιστίνη, derived from the Heb. *Pelesheth*, Philistia), a country of western Asia, now forming a part of the Turkish empire, bounded N. by the Lebanon mountains, which separate it from Cœle-Syria, E. and S. by the desert which separates it from Arabia and Egypt, and W. by the Mediterranean. It lies between lat. 30° 40′ and 33° 15′ N., and lon. 33° 45′ and 36° 30′ E.; length about 200 m., average breadth 60 m.; area, 12,000 sq. m.; pop. estimated at 300,000. The name Palestine was never applied by the ancient Hebrews to anything more than the southern portion of the coast region, as synonymous with Philistia; and when it occurs in the English translation of the Bible it has this sense. The earlier Greek usage was the same; but under the Romans it became the general name for the whole country of the Jews, and Josephus uses it in both the early and the later application. Modern Palestine is included in the vilayet of Syria, and contains the two sub-pashalics of Acre and Jerusalem. It is a "land of hills and valleys." It is remarkably separated by mountain and desert from other countries, and its seashore is without any good harbor. The ancient harbor of Cæsarea, the principal port during the Roman dominion, was entirely artificial, and the ruins of its breakwater are now only a dangerous reef. From Tyre, which is N. of Palestine proper, to the borders of Egypt, there is now but one port, Jaffa, and this only allows landing by boats under favorable circumstances. From the coast on the west the land rises rapidly to a mountainous height in the centre, and declines on the other side to the low level of the desert, being cleft through the centre N. and S. by the deep valley of the Jordan. This depression, called by the Arabs el-Ghor, is the most characteristic feature of the physical geography of Palestine, and corresponds with the valley of the Orontes and Leontes in Cœle-Syria, and with the wady Arabah in Arabia Petræa. The coast level varies much in breadth, being in some places only a narrow pass between the mountains and the sea, and in others expanding into plains of considerable width. The southern portion of the coast level is termed in the Scriptures the plain or low country (Heb. *Shefelah*), and the western part of it was the abode of the Philistines. This plain is very fertile, and is covered with corn fields. N. of it is a plain less level and fertile, the Sharon of the Scriptures, a land of fine pastures, which under the Roman empire contained Cæsarea, the Roman capital of Palestine. Beyond Cæsarea the plain grows narrower, until it is terminated by Mt. Carmel, N. of which lies the plain of Acre, about 15 m. long from N. to S., and about 5 m. in average breadth from the seashore to the hills on the east. Mt. Carmel is a ridge about 10 m. long and 1,500 ft. high, stretching N. by W., and terminating at the sea in a high promontory which encloses on the south the bay of Acre. North of Mt. Carmel are the Lebanon mountains (in the wider sense), which consist of two parallel ranges running N. into Syria, and enclosing between them a beautiful and fertile plain, called in Scripture the valley of Lebanon, and by the classic writers Cœle-Syria, the "hollow or enclosed Syria." This plain, only the extreme southern portion of which is in Palestine, is 90 m. long and from 10 to 20 m. broad, except at the S. end, where it is narrower. The western range of these mountains runs nearly parallel to the sea, into which it projects several promontories; and its average elevation is about 7,000 ft., while its loftiest summits, including Jebel Timarun (10,533 ft. according to Burton) and Jebel Makmel (9,998 ft.), are covered with perpetual snow. These summits are outside of Palestine, as is the natural amphitheatre in which grow the finest specimens that remain of the famous cedars that once covered all the mountains of Lebanon. This great western range was called Libanus by the classic writers, and to the eastern range they gave the name of Anti-Libanus. In the Scriptures both ranges are called Lebanon. They are composed of masses of limestone rock. The general elevation of Anti-Libanus is less than that of Libanus, but at its southern extremity rises the conical snow-clad peak of Hermon, called by the Arabs Jebel esh-Sheikh (the chief), or eth-Thelj (the snowy), to the height of about 10,000 ft., rivalling the highest peaks of Libanus, and overlooking all Palestine. S. of Hermon the Anti-Libanus sinks into the hills of Galilee, which rise from a table land elevated about 1,000 ft. above the sea, and sloping on the east to the Jordan, on the west to the plain of Acre, and on the south to the plain of Esdraelon. The last named plain, extending from the sea to the Jordan, is often mentioned in the Scriptures under the names of Megiddo, Jezreel, and others, and was the great battle field of Jewish history. It is traversed by ridges known as the mountains of Gilboa and Little Hermon. On its N. E. border stands Mt. Tabor, now known as Jebel et-Tur, the traditional scene of the transfiguration. Though only 1,800 ft. high, it is one of the most remarkable and interesting of the mountains of Palestine. It is sometimes called the southern termination of the Lebanon range, but rises abruptly from the plain, and is entirely insulated except on the west, where a narrow ridge joins it to the rocky hills about Nazareth. It is densely covered with trees and shrubs, except a small tract on the top. Its isolated summit commands a panoramic view of the principal places of Samaria and Galilee, and was the rendezvous of Barak from which he rushed down to the defeat of Sisera. In the middle ages it was the resort of many hermits. It is now covered with ruins of a fortress of Saracenic architecture, while there are also remains of a far earlier period. S. of the plain of Esdraelon stretches an unbroken tract of mountains, about 30 m. in breadth, and rising in height toward the south till near Hebron it attains an elevation of 3,000 ft. above the sea. The northern part of this region comprised Samaria, and the southern Judea. The principal mountains of Samaria are Ebal and Gerizim, which rise to the height of about 2,700 and 2,600 ft. respectively above the sea, the former N. and the latter S. of a narrow valley in which stands the town of Nablus, the ancient Shechem, the capital of the ten tribes after their secession from the rest of Israel.—The hills of Judea are masses of barren rock, for the most part of moderate apparent elevation, though their general height above the sea is 2,000 or 3,000 ft. On their E. face these mountains descend abruptly to the great valley of the Jordan, their general slope being furrowed by steep and rugged gorges, which form the beds of winter torrents. The precipitous descent from Jerusalem to Jericho is famous for difficulty and danger, and is an example of the valleys descending to the Jordan through all its length. The W. slope of the hills is more gradual and gentle, but still difficult of passage, and the central heights of Palestine are a series of natural fastnesses of great strength; and both in ancient and modern times armies have traversed the western plains from Egypt to Phœnicia without disturbing the inhabitants of the hill country. The Jordan is the only important river of Palestine. Its sources are mainly on the southern and western declivity of Mt. Hermon, and after a short course its head streams unite and flow into Lake Merom, now called Lake Huleh. After quitting this the river is sluggish and turbid for a short distance, till it passes over a rocky bed where its mud is deposited, and then rushes on through a narrow volcanic valley. About 13 m. below Lake Huleh it enters the lake of Gennesaret or Tiberias, or sea of Galilee, which is between 600 and 700 ft. lower than the level of the Mediterranean. On issuing from the S. end of this lake the river enters a valley from 5 to 10 m. wide, through which its course is so winding that within a space of 60 m. in length the river traverses 200 m. and descends 27 rapids through the ever deepening valley, until it finally enters the Dead sea at a depression of a little over 1,300 ft. below the level of the Mediterranean, after a total direct course from N. to S. of 120 m. At the mouth the river is 180 yards wide. Except the Jordan, Palestine has no streams considerable enough to be called rivers; those so called in its history are mere brooks or torrents which become dry in summer. The Kishon, now Nahr el-Mukutta, which enters the bay of Acre near Mt. Carmel, flows from Mt. Tabor, and in winter and spring is a large stream, while during the rest of the year it has water only in the last 7 m. of its course. The Kanah enters the Mediterranean between Cæsarea and Jaffa. The Arnon, often mentioned in Scripture, is now called the wady Modjeb; it rises near the S. E. border of the country, and flows circuitously to the Dead sea. The Jabbok, now the wady Zurka, N. of the Arnon, flows a parallel course into the Jordan. The brook Kedron flows through the valley of Jehoshaphat, on the E. side of Jerusalem, to the Dead sea, but is merely a torrent and not a constant stream. Springs and fountains of remarkable size, however, are found in different parts of the country. The principal lakes are the Dead sea in the south and the lake of Gennesaret in the north.—In many parts of the country, and especially in the valley of the Jordan and the vicinity of the Dead sea, there are indications of volcanic origin, and earthquakes are often felt. The mountains are mostly of oölitic limestone of a light gray color. Black basalt is very common. The general character of the scenery is stern and sombre. "Above all other countries in the world," says Dean Stanley, "it is a land of ruins. In Judea it is hardly an exaggeration to say that, while for miles and miles there is no appearance of present life or habitation, except the occasional goatherd on the hillside or gathering of women at the wells, there is hardly a hilltop of the many within sight which is not covered with the vestiges of some fortress or city of former ages. The ruins we now see are of the most distant ages: Saracenic, crusading, Roman, Grecian, Jewish, extending perhaps even to the old Canaanitish remains before the arrival of Joshua." (See BASHAN.)—Palestine has a mild and steady climate, with a rainy season in the latter part of autumn, winter and a dry and almost rainless season constituting the rest of the year. The heat of summer is oppressive in the low lands, especially in the deep depression of the Jordan valley, but not among the hills; and the cold of winter is not sufficient to freeze the ground, though snow sometimes falls to the depth of a foot at Jerusalem. Though the mountains have an exceedingly barren appearance, the plains and valleys are remarkably fertile. The valley S. of Bethlehem is irrigated and cultivated with care, and has a rich and beautiful appearance. The hill country of the south is dryer and less productive than that of the north. In ancient times even the mountains were cultivated by means of terraces; but in consequence of wars and the depopulation of the country, the terraces have been neglected and broken down, and the soil of the mountains swept by rains and torrents into the valleys. On some of the hills, however, the terraces have been rebuilt, and planted with olives, figs, and the vine; but the greater part are either bare or covered with a rough growth of stunted oak. There are now no forests, and most of the trees of the country are small. The olive, fig, and pomegranate are largely cultivated, and are the most common trees. Besides these are the terebinth or turpentine tree, the oak, sycamore, mulberry, pine, pistachio, laurel, cypress, myrtle, almond, apricot, walnut, apple, pear, orange, and lemon. The number of shrubs and wild flowers is very great, and always attracts the attention of travellers; and there is such a prevalence of anemones, wild tulips, poppies, and other red flowers, as to give a scarlet color to the landscape. Palestine has always been famous for its grapes, which are remarkable alike for size and flavor. The chief agricultural productions are wheat, barley, maize, and rye. Rice is grown on the marshy borders of the Jordan and some of the lakes. Peas, beans, and potatoes are cultivated, and also tobacco, cotton, and sugar cane. The agriculture is of a rude and negligent character; the fields are seldom fenced, the few divisions being by dilapidated stone walls, or by irregular hedges of the prickly pear. More attention is paid to pastoral pursuits, and flocks of sheep and goats are very numerous. Cattle are few and poor. The roads being impracticable for wheeled vehicles, camels are the principal beasts of burden. Asses and mules are much used for riding, and fine Arabian horses are sometimes met with. The chief wild animals are bears, wild boars, panthers, hyænas, jackals, wolves, foxes, and gazelles. Lions, which were found here in ancient times, are now extinct. Birds are few in number, though there are many distinct species, among which may be mentioned the eagle, vulture, osprey, kite, hawk, crow, owl, cuckoo, kingfisher, woodpecker, woodcock, partridge, quail, stork, heron, pelican, swan, goose, and duck. Venomous serpents are unknown, and the most noxious animals are scorpions. Mosquitoes are very common, and bees are extremely plentiful, depositing their honey in hollow trees and holes in the rocks. Locusts occasionally appear in vast swarms and devour every species of vegetation.—The present inhabitants of Palestine are a mixed race of very varied origin. The Mohammedans are the dominant and most numerous sect, and are composed of a few Turks who occupy the higher government situations, and of the great body of the common people, who are descended from mixed Arab, Greek, and ancient Syrian ancestors, the last element greatly preponderating. They are noble-looking, graceful, and courteous, but illiterate, fanatical, and indolent. The Christians are almost entirely of Syrian race, descendants of those who occupied the country when it was conquered by the Saracens. They belong mostly to the Greek church, of which there is a patriarch at Jerusalem, who has ecclesiastical jurisdiction over the whole of Syria. Under him are eight bishops, whose sees are Nazareth, Acre, Lydda, Gaza, Sebaste, Nablus, Philadelphia, and Petra. There are also a few Maronites and Roman Catholics in the large towns, and in Jerusalem about 200 Armenians under a patriarch of their own faith. The Jews, mostly from Spain, with a few from Poland and Germany, are about 10,000 in number, and live almost exclusively in the towns of Jerusalem, Hebron, Tiberias, and Safet. The population is less than one tenth of what it was in ancient times.—Palestine was first known as Canaan. But this name was confined to the country between the Mediterranean and the Jordan, the principal region E. of that river being called the land of Gilead. Palestine was subsequently called the land of promise, the land of Israel, Judah, Judea, and the Holy Land. The term Judea, though in later periods of Jewish history frequently applied to the whole country, belonged, strictly speaking, only to the southern portion of it. In the earliest times in which Palestine or Canaan becomes known to us, it was divided among various tribes, whom the Jews called collectively Canaanites. The precise locality of these nations is not in every case distinctly known. The Kenites, the Kenizzites, the Kadmonites, and a part of the Amorites lived E. of the Jordan; while W. of that river dwelt the Hittites, the Perizzites, the Jebusites, and most of the Amorites, in the hill country of the south; the Canaanites proper, in the middle; the Girgashites, along the E. border of the lake of Gennesaret; and the Hivites, mostly in the north among the mountains of Lebanon. The southern part of the coast was occupied by the Philistines and the northern by the Phœnicians. After the conquest of Canaan by the Israelites under Moses and Joshua, the land was distributed among the tribes. Judah, Simeon, Benjamin, and Dan occupied the south; Ephraim, half of Manasseh, and Issachar, the middle; and Zebulon, Naphtali, and Asher, the north. Reuben, Gad, and the other half of Manasseh were settled beyond the Jordan. After the division into two kingdoms by the secession of the ten tribes (about 975 B. C.), the boundary line between them was the northern limit of the tribe of Benjamin. In the time of Christ Palestine was subject to the Romans, and the country W. of the Jordan was divided into the provinces of Galilee, Samaria, and Judea. Galilee was that part of Palestine N. of the plain of Esdraelon, and was divided into lower or southern and upper or northern Galilee. Samaria occupied nearly the middle of Palestine. Judea as a province corresponded to the N. and W. parts of the ancient kingdom of Judah; but the S. E. portion formed a part of the territory of Idumæa. On the other side of the Jordan the country was called Peræa, and was divided into eight districts, viz.: 1, Peræa in a limited sense, which was the southernmost district, extending from the river or brook Arnon to the river Jabbok; 2, Gilead, N. of the Jabbok; 3, Decapolis, or the district of ten cities, which, as nearly as can be ascertained, were Scythopolis or Bethshan (which however was on the W. side of the Jordan), Hippos, Gadara, Pella, Philadelphia or Rabbah, Dion, Canatha, Galasa or Gerasa, Raphana, and perhaps Damascus; 4, Gaulonitis, extending N. E. of the upper Jordan and of the lake of Gennesaret; 5, Batanea, E. and S. E. of Gaulonitis; 6, Auranitis, with Ituræa, N. E. of Batanea, now known as the desert of Hauran; 7, Trachonitis, N. of Auranitis; 8, Abilene, in the extreme north, among the mountains of Anti-Libanus.—The earlier part of the history of Palestine is treated in the article Hebrews. The country remained subject to the Roman and Byzantine emperors for more than six centuries after Christ. The Jews, after frequent rebellions, in one of which, A. D. 70, Jerusalem was destroyed by Titus, were mostly driven from the country and scattered as slaves or exiles over the world. With the spread of Christianity, Palestine became the resort of vast numbers of pilgrims, and Jerusalem was made the seat of a patriarch. The emperor Constantine and his mother Helena erected throughout the land costly memorials of Christian faith, marking with churches, chapels, or altars every spot supposed to have been the scene of the acts of the Saviour. In 614 the Persians under Chosroes II. invaded Palestine, and, assisted by the Jews to the number of 26,000, captured Jerusalem. It was regained by Heraclius, but was conquered by the Mohammedan Arabs in 637. For the next two centuries the country was the scene of civil war between the rival factions of the Ommiyade, the Abbasside, and the Fatimite caliphs. From the middle of the 8th century it was a province of the Abbasside caliphs of Bagdad till 969, when it fell under the power of the Fatimite rulers of Egypt. In 1076–'7 it was conquered by the Seljuk Turks, but in 1096 it was regained by the Egyptian sultans, in whose possession it was when invaded by the crusaders in the following year. The crusaders made Godfrey of Bouillon ruler of Jerusalem, and he and his successors reigned in Palestine till Jerusalem was retaken by Sultan Saladin in 1187, and the Christian kingdom overthrown. Two years afterward another crusade was undertaken under Philip, king of France, Richard I. of England, and the emperor Frederick Barbarossa of Germany. It did not regain Jerusalem, but partially restored the Christian rule upon the coast. Another crusade in 1216, chiefly of Hungarians and Germans, met with little more success. Still another, undertaken by the emperor Frederick II. in 1228, resulted in the recovery of Jerusalem, and the Christian dominion was reëstablished over a considerable extent of territory; but after various vicissitudes of fortune, and in spite of repeated succors from Europe, it finally yielded to the arms of the Egyptian Mamelukes in 1291. The sultans of Egypt held it till 1517, when it was conquered by the Turks, in whose possession it has remained till the present time, with the exception of a brief occupation in 1839–'41 by the forces of the rebellious pasha of Egypt, Mehemet Ali.—Much attention has been given in recent times to the careful exploration of Palestine, with important results in the identification of places named in Scripture. This began with the work of Dr. Edward Robinson, the results of which were published in his "Biblical Researches" (3 vols. 8vo, Boston, 1841) and "Later Researches" (1856). Among the most recent explorations have been those of the British society organized in 1865 under the name of the "Palestine Exploration Fund," the reports of which appear in the work of Captains Wilson and Warren, entitled "The Recovery of Jerusalem" (8vo, London, 1871), and in quarterly statements issued since that work. Among the results of the English explorations have been the trigonometrical survey of a great part of Samaria and Judea, the discovery of some remarkable Greek inscriptions of Christian origin within the Haram enclosure at Jerusalem, and the identification of a great number of Biblical and classical sites, among which are the rock Etam, Alexandrium, Chozeba, Maarath, the cliff of Ziz, Hareth, Ziph, Maon, the hill of Hachilah, the Levitical city of Debir, Ecbatana (a Roman city on Mt. Carmel), Archelais, Sycaminum, Eshtaol, Seneh (the scene of Jonathan's victory and the site of the Philistine camp), the rock Oreb, the wine press of Zeeb, the altar of Ed, the high place of Gibeon, the city of Nob, and the cave of Adullam. Among the latest identifications is Bethabara, the scene of the baptizing by John, which Lieut. C. E. Conder in 1875 fixed at the ford known as Makhadet Abara, holding that it is a different place from the Bethabara of the book of Judges. The American "Palestine Exploration Society," organized in 1871, sent out expeditions in 1872 under command of Lieut. Edgar L. Steever, jr., and in 1874 under Prof. H. M. Paine. This society has left the region about Jerusalem to the British organization already in the field, and has undertaken to survey the region E. of the Jordan. It has published the results of its work in three "Statements," issued in 1871, 1873, and 1875. The report of 1875 states that Mt. Pisgah has been identified with the S. W. summit of a triple mountain called by the Arabs Jebel Siaghah, about 10 m. E. of the N. end of the Dead sea. (See PISGAH.)—Among the most important works on Palestine, besides those already named, are those of Kitto, "Palestine" (London, 1841); Munk, *Palestine: description géographique, historique et archéologique* (Paris, 1845; German ed. by M. A. Levy, Breslau, 1871); Lynch, "Official Report of the Expedition to the Dead Sea" (8vo, Philadelphia, 1849); Churchill, "Mount Lebanon" (4 vols. 8vo, London, 1853-'62); Stanley, "Sinai and Palestine" (8vo, 1856); Prime, "Tent Life in the Holy Land" (12mo, New York, 1857); Porter, "Handbook for Travellers in Syria and Palestine" (2 vols., London, 1858; 2d ed., 1868); Thomson, "The Land and the Book" (2 vols. 8vo, New York, 1859); Tristram, "Topography of the Holy Land" (8vo, 1872); and Ritter, *Die Erdkunde*, vols. xiv.-xvii., translated into English under the title of "Comparative Geography of Palestine and the Sinaitic Peninsula" (4 vols. 8vo, Edinburgh, 1866).

PALESTRINA (anc. *Præneste*), a town of Italy, in the province and 23 m. E. S. E. of Rome; pop. about 6,000. It is built almost entirely on the site of the ancient temple of Fortune, which after its restoration by Sulla occupied the whole lower slope of the hill, more than 2,000 ft. high, with a citadel on the summit, which was replaced by a mediæval castle. The only notable buildings are the deserted Barberini palace and the church of San Rosario, with tombs of the Barberini and Colonna families, the latter preponderating here during the middle ages. (See PRÆNESTE.)

PALESTRINA, Giovanni Pietro Aloisio da, an Italian composer, born in Palestrina in 1524, died in Rome, Feb. 2, 1594. In 1551, having gained some distinction as a composer, he was admitted among the singers of the pontifical chapel, and a few years later was made chapelmaster by Pope Julius III., to whom he had dedicated four masses for four voices. He was the first upon whom this title was conferred. In 1555 he was dismissed from office by Paul IV. for having married, and for several years he was successively chapelmaster at the churches of St. John Lateran and Santa Maria Maggiore. In 1571 he was appointed chapelmaster of St. Peter's, and shortly after maestro to the congregation of the Oratory. The subject of improving ecclesiastical music having been referred by the council of Trent to a committee, a discussion arose respecting the secular tunes which then formed the principal themes of most masses and psalms. Palestrina, being called upon to compose a work in a more simple and devotional style, for the sake of contrast, produced his celebrated "Mass of Pope Marcellus." His music, consisting chiefly of masses, psalms, motets, and madrigals, is grave and learned. A *Stabat Mater*, and specimens of his masses, motets, and madrigals, have been published by A. E. Choron, but the greater part of his works are to be found only in the large libraries of Europe. Some of his masses and motets are still employed in the service of the Roman Catholic church, and three of his motets adapted to versions of the Psalms are in use in the English cathedral service.—See Baini, *Memorie della vita e delle opere di Palestrina* (2 vols. 4to, Rome, 1828; German, Leipsic, 1834).

PALEY. I. William, an English theologian, born in Peterborough in July, 1743, died May 25, 1805. He graduated at Christ's college, Cambridge, as senior wrangler, in 1763, and after teaching for three years returned to his college as fellow, became a tutor, and lectured on moral philosophy and divinity. In 1775 he became rector of Musgrove in Westmoreland, and shortly after married. After other preferments, he was made in 1782 archdeacon of Carlisle. In 1785 appeared his "Principles of Moral and Political Economy," the copyright of which brought him £1,000. He published "Horæ Paulinæ" in 1790, and "Reasons for Contentment" in 1791. In 1794 appeared his "View of the Evidences of Christianity," and three additional preferments were immediately conferred on him, one of them worth £1,000 per annum. His political sentiments prevented his preferment to a bishopric. In 1802 he published his "Natural Theology." His ethical theory denies the existence of a moral sense or any original moral constitution of human nature, and makes the expectation of future reward or punishment the only motive of virtuous action. Utility is the ground of obligation, but it must be determined with reference to remote as well as direct efforts, to eternity as well as time. Applying this principle to politics, he makes the "will of God as collected from expediency" the ground of civil obedience. If an illegitimate government has become peaceably established so that it advances the good of the subjects, public utility requires that it should be obeyed; but if a legitimate government is injurious to the public welfare, it should be overthrown. He affirms that the "divine right of kings is on the same footing with the divine right of constables," namely, the law of the land. "The final view," he says, "of all natural politics is to produce the greatest amount of happiness." Expediency prevails even in his view of religious establishments, no one form of which, he contends, is a part of Christianity. The authority of the church is founded on its utility. His greatest work is his "Natural Theology," designed to demonstrate the existence and perfections of God from the evidences of design in the adaptations of nature. The proof is entirely *a posteriori*, no appeal being made to man's moral instincts or *a priori* ideas. An annotated edition by Lord Brougham and Sir Charles Bell was published in 1836 (2 vols. 8vo), to which were added by the former in 1839 "Dissertations on Subjects connected with Natural Theology" (2 vols.), and a "Discourse of Natural Theology." A complete edition of his works was edited by his son, the Rev. Edmund Paley (4 vols., London, 1838). The best biography is that by Meadley (1839). **II. Frederick Apthorp**, an English author, grandson of the preceding, born at Easingwold, near York, in 1816. He graduated at St. John's college, Cambridge, in 1838, continuing his residence till 1846, when he became a Roman Catholic. He is now (1875) classical examiner in the university of London. He has published several architectural and ecclesiological works, the most important of which are a "Manual of Gothic Mouldings" (8vo, London, 1845), and "A Manual of Gothic Architecture" (1846). He has edited with notes Æschylus, Euripides, Hesiod, Ovid's *Fasti*, Propertius, Theocritus, Homer's Iliad, and other works, and has translated into English the plays of Æschylus (1864) and the odes of Pindar (1869).

PÁLFFY, a Hungarian family founded by Count Conrad of Altenburg, ambassador of the emperor Conrad II. in Hungary, in the 11th century, whose descendants formed in the following century the houses of Konth and Hédervár. Paul II. of the former branch assumed the name Pálffy (son of Paul), to which his descendant Paul III. added that of Erdöd, the family name of his wife. Nicholas II., grandson of the latter (1550–1600), gave celebrity to the family by his prowess against the Turks; and his son Stephen II. was made a count in 1634. Subsequently there were other branches of the house, and the representative of the elder branch, Joseph Francis (1764–1827), a descendant of Nicholas II., was made a prince in 1807. The most distinguished soldier among the younger branch was Count John IV. (1659–1751), who restored peace in Hungary in 1711 by the treaty of Szatmár, and was appointed governor general there by Maria Theresa in 1741. The family is still prominent in Hungary.

PÁLFFY, Albert, a Hungarian author, born in Grosswardein in 1813. He studied law, but devoted himself to literature at Pesth, and after the revolution of March, 1848, founded the ultra-radical journal *Marczius tizenötödike* ("The 15th of March"), which promoted the patriotic excitement. He received an office from the revolutionary authorities, but denounced them as too conservative, and was imprisoned for a time in 1849. He afterward lived abroad till 1861, when he returned to Pesth. He has published several novels.

PALFREY, John Gorham, an American author, born in Boston, May 2, 1796. He graduated at Harvard college in 1815, studied theology, and in June, 1818, was ordained minister of the Congregational church in Brattle square, Boston. From 1831 to 1839 he was professor of sacred literature in Harvard university, and from 1835 to 1842 was editor of the "North American Review." In 1842 he delivered before the Lowell institute in Boston a course of lectures on the "Evidences of Christianity," which were afterward published (2 vols., 1843). This was followed by "Lectures on the Jewish Scriptures and Antiquities" (4 vols., 1838–'52). He had previously published "Harmony of the Gospels" (1831), "Sermons" (1834), and "Academical Lectures" (1838), besides occasional sermons, &c. In 1842–'3 he was a member of the Massachusetts legislature, and from 1844 for several years secretary of state of Massachusetts. In 1846 he wrote a series of newspaper articles on "The Progress of the Slave Power," which were collected into a volume. He was elected to congress as a whig in 1846; but having in December, 1847, refused on anti-slavery grounds to vote for Robert C. Winthrop as speaker, he was defeated at the next election (1848), after an animated contest in which there were 17 ballotings. Meanwhile he had become a leader of the freesoilers, and in 1851 was one of the editors of the "Commonwealth," the chief organ of that party in New England. He was also the unsuccessful candidate of the party for governor of the state. He afterward devoted himself to literature, but from 1861 to 1866 was postmaster at Boston. In 1852 he published a review of Lord Mahon's "History of England," and in 1854 "Remarks on the proposed Constitutional Amendments," and "The Relation between Judaism and Christianity." The first volume of his "History of New England" was published in 1858, the second in 1860, and the third in 1865, bringing it down to 1688.—His daughter, SARAH HAMMOND, under the *nom de plume* of E. Foxton, has published "Prémices," a volume of poems (1855), "Herman" (1866), and "Agnes Wentworth" (1869).

PALGRAVE. I. Sir Francis, an English author, born in London in July, 1788, died at Hampstead, July 6, 1861. He belonged to a Jewish family named Cohen, which name he exchanged for that of Palgrave, the maiden name of his wife's mother. He studied law, and was managing clerk in a law office till 1822, when he was employed by the commissioners of records. He had edited a collection of Anglo-Norman *chansons* in 1818, but first became known as the editor of the "Parliamentary Writs," published by the commissioners of public records (4 vols. fol., 1827–'34). He was admitted to the bar at the Inner Temple in 1827. In 1831 he published a pamphlet on "Conciliatory Reform," and a "History of England: the Anglo-Saxon Period," in Murray's "Family Library." About the same time he was elected fellow of the royal society and of the society of antiquaries. In 1832 he was knighted "for his general services and his attention to constitutional and parliamentary literature." His "Rise and Progress of the English Commonwealth" (2 vols. 4to, 1832) is devoted to the Anglo-Saxon polity and manners, and is especially valuable to the student of English jurisprudence. In 1833 he was appointed by the king one of 20 commissioners to inquire into the existing state of the municipal corporations of England and Wales; but dissenting from the report of the majority of the commission, he presented his own views in a "Protest" (1835). On the reconstruction of the record office in 1838 he was appointed deputy keeper of her majesty's public records, and continued in this office till his death. His other works are: *Rotuli Curiæ Regis* (2 vols., 1835); "Calendars and Inventories of the Treasury of the Exchequer" (3 vols., 1836); "Documents illustrating the History of Scotland" (1837); "Truths and Fictions of the Middle Ages: the Merchant and the Friar" (1837); "Essay upon the Authority of the King's Council" (1844); and "History of Normandy and England" (4 vols., 1851–'64). He also wrote the first edition of Murray's "Handbook to North Italy," and was for many years a constant contributor to the "Quarterly Review." **II. Francis Turner**, an English poet, son of the preceding, born in London, Sept. 28, 1824. He completed his education at Oxford, and was successively vice principal of a normal college, assistant in the educational department of the privy council, and private secretary to Earl Granville. His principal works are: "Idyls and Songs" (London, 1854); "Essays on Art" (1866); "A Life of Sir Walter Scott" (1867); "Hymns" (1867; enlarged ed., 1868); and "Lyrical Poems" (1871). **III. William Gifford**, brother of the preceding, born in Westminster, Jan. 24, 1826. He graduated at Oxford in 1846, and in 1847 was commissioned as second lieutenant in the 8th Bombay native infantry. He left India in 1853, resigned his commission, joined the Roman Catholic church, and became a member of the society of Jesus. After his novitiate he completed his theological studies in the Jesuit seminary at Laval, was ordained priest, and at his own request was sent to the Jesuit mission in Syria, where his intimate knowledge of Arabic gave promise of special usefulness. Wishing to extend the field of missionary enterprise into the unexplored countries of central Arabia, he submitted his project to the general of the society and the propaganda, who gave it their approbation, while the French government, as the protector of the Syrian missions, furnished the necessary funds. He set out from Maan on the western verge of the Sherarat desert June 16, 1862, travelled under the disguise of a physician through the territories subject to the Wahabees, escaped from their capital, Riyad, with great risk to his life, Nov. 24, and arrived at Katif, in Hasa, Dec. 22. After having suffered shipwreck on the coast of Oman, he returned to Europe through Bagdad and Aleppo. He left the society of Jesus in 1864, and published "Personal Narrative of a Year's Journey through Central and Eastern Arabia" (2 vols., London, 1865), receiving for it the gold medal of the French geographical society. In July, 1865, Palgrave was sent to the East on a special mission for the release of the English and other prisoners held by the Abyssinian monarch Theodore. He remained in Egypt till June, 1866, when he returned to England, and was appointed consul at Sukhum-Kalé July 23, and at Trebizond May 20, 1867. He is at present (1875) consul at St. Thomas, West Indies. In 1872 he published "Essays on Eastern Questions" and "Hermann Agha," and in 1875 "Alkamah's Cave, a Story of Nejd."

PALIKAO, Charles Guillaume Marie Apollinaire Antoine Cousin-Montauban, count de, a French soldier, born in Paris, June 24, 1796. In early life he served in the French army in Spain, and afterward in Algeria, where he became a general of division in 1855. In 1858–'9 he held various commands in France, and in 1860 distinguished himself as commander in China, in conjunction with the English forces, especially at Pa-li-kia-ho (Sept. 21), whence his title. The spoliation of the Chinese summer palace near Peking caused the legislative body to disallow the annuity of 50,000 francs which had been proposed for him; but it was discovered in 1872 that the emperor had appropriated 600,000 francs from the Chinese indemnity for the benefit of Palikao, without a shadow of authority. In August, 1870, after the first reverses of the French arms, he succeeded Émile Ollivier as prime minister, and acted at the same time as minister of war. He organized a large force at Châlons, formed several new army corps, placed Trochu in command of Paris, published fictitious reports of victories, and was held in a great measure responsible for the disaster of Sedan, after which he fled to Belgium. In December, 1871, he published a vindication of his administration.

PALI LANGUAGE. See India, Races and Languages of, vol. ix., p. 216.

PALIMPSEST (Gr. *παλίμψηστος*, from *πάλιν*, again, and *ψῆν*, to rub), a parchment which has been written upon twice or oftener, the prior writing having been erased and the surface prepared for the new by rubbing. The ancients used the word in this sense, but they also applied it to leaves or books used by authors for a preliminary writing of their works, which were so made that the ink could be wiped off in order to make corrections and revisions. After the conquest of Egypt by the Saracens, western Europe was cut off from the papyrus which it had previously drawn from that country, and the supply of parchment being limited, recourse was had to the erasure of ancient manuscripts. This practice, which prevailed in the West from the 7th or 8th century throughout the dark ages, and in the East, which was not deprived of papyrus so soon, from about the 11th century, was long supposed to have caused the destruction of a vast amount of classical literature, sacrificed by the monkish transcribers to the needs of missals, antiphonaries, and other religious writings; but it has resulted rather, through the deciphering of the expunged works, in the recovery of important fragments of ancient authors, many of which would otherwise have been lost irrecoverably. Two processes were used by the mediæval scribes in the preparation of palimpsests, in the first of which the writing was washed off with a sponge and the parchment smoothed when dry by rubbing with pumice stone; in the second either entire lines were scraped off with a sharp blade, or each letter was erased separately, the surface being afterward rubbed smooth with pumice stone or with a polishing tool. The success of the erasure depended materially on the kind of ink with which the writing was executed. If vegetable, it was easily expunged, as it did not strike into the body of the skin; but if it contained animal or mineral matter, it was impossible to remove entirely the original writing, traces of which could be distinctly seen in many cases even after the surface had been rubbed off. Most of the ancient manuscripts were written with ink composed of lampblack, gum, and vitriol, which so penetrated the skin that it could not be entirely removed; for, if invisible to the eye, its presence can still be detected by proper chemical treatment.—Various means have been adopted in modern times to revive the erased writings of palimpsests. Among the first was to wash the parchment with an infusion of galls and to expose it afterward to the light. This process frequently reproduced the ancient characters so that they could easily be read; but in some cases it blackened the entire parchment so as to render illegible both the old and the later writing. In 1787 Sir Charles Blagden proposed a "new method of recovering the legibility of decayed writings," viz., to dip the manuscript, after a careful washing in water, into diluted muriatic acid and afterward into a solution of prussiate of potash. A similar treatment was proposed by Prof. Gioberti of the university of Turin, and a preparation founded upon it received the name of *tinctura Giobertina*. A preparation of sulphuretted ammonia has also been used with success. When the ink contains some animal substance, such as the blood of the cuttle fish or milk, Prof. Mone recommends that the parchment be immersed in oil in a close vessel and subjected to a heat of 400° R. By means of these and other modes of treatment the ancient writing of many palimpsests has been rendered legible enough to be deciphered by experienced palæographers; and in several cases two writings have been brought to light under the superficial one.—Among the earliest to direct attention to palimpsests was Louis Boivin, who thoroughly examined and described the text of the Ephraem palimpsest (see Manuscript, vol. xi., p. 133), discovered by Peter Allix near the close of the 17th century. Montfaucon also called attention to the importance of palimpsest manuscripts in his *Palæographia Græca* (1708); but it was not until the last half of the 18th century that much progress began to be made in their decipherment. In 1762 F. A. Knittel published a portion of the Epistle to the Romans in the Gothic text of Ulfilas, found under a copy of the *Origines* of Isidorus in a manuscript preserved in the library at Wolfenbüttel; and in 1773 P. J. Bruns recovered and published a part of the 91st book of Livy from a palimpsest in the Vatican. But by far the greatest explorer in the field of palimpsest literature was Cardinal Angelo Mai, who published from 1814 to 1853 many invaluable fragments of classic authors before reckoned as lost; among them were the *De Republica* of Cicero and portions of the histories of Polybius, Diodorus Siculus, Dionysius of Halicarnassus, Dion Cassius, Appian, and Iamblichus. His success gave zest to the study, and through the labors of Niebuhr and others the greater part of the Institutes of Gaius were recovered from a manuscript at Verona and published in 1820. Other investigators who have rendered important service to literature in this department are Barrett, Blume, Peyron, G. H. Pertz and his son Karl Pertz, Gaupp, F. J. Mone and his son Fridegar Mone, Cureton, Hase, Tregelles, and Tischendorf. (See Manuscript.)

PALINURUM, a promontory of Lucania in Italy, on the Tyrrhenian sea, about half way between Velia and Buxentum; lat. 40° N., long. 15° 15′ E. It derived its name from the tradition, recorded by Virgil, that on this spot Palinurus the pilot of Æneas was buried. Some ruins of ancient buildings, still visible on the summit of the headland, are popularly known as the tomb of Palinurus. Near this promontory, during the first Punic war, 253 B. C., a Roman fleet under the consul Cervilius Cæpio and Sempronius Blæsus was wrecked and 150 vessels lost; and again in 36 B. C. a portion of the fleet of Octavius was lost on the coast between Velia and Palinurus Portus, a harbor formed by the cape, and now called Porto di Palinuro.

PALISOT, Ambroise Marie François Joseph Beauvois de, a French naturalist, born in Arras in 1752, died in Paris, Jan. 21, 1820. He sailed for the coast of Guinea in 1786, and was the first naturalist to explore the kingdom of Benin. His health having broken down, he went in 1788 to Santo Domingo, and in 1790 obtained a place in the colonial council. In 1791 he was sent on an unsuccessful mission to Philadelphia for assistance against the revolted negroes of Santo Domingo, and on his return to the colony in June, 1793, he was imprisoned and barely escaped being murdered by them. He reached Philadelphia in great destitution, and supported himself as a teacher of music and languages; but the French chargé d'affaires enabled him to make a botanical excursion through some of the United States. Permitted to return to France in 1798, after having been proscribed during the revolution, he became in 1806 a member of the institute, and in 1815 of the council of the university. Among his illustrated works are: *Flore d'Oware et de Benin* (2 vols., Paris, 1804-'21); *Insectes recueillies en Afrique et en Amérique* (1805-'21); and *Muscologie, ou traité sur les mousses* (1822).

PALISSY, Bernard, a French potter, born at Capelle-Biron, near Agen, about 1510, died in Paris in 1590. He was first employed, as we learn from himself, in "portraiture and vitrifaction," which probably means that he painted on glass; and being acquainted with geometry, he was occasionally employed in surveying and in drawing maps. Having seen some ornamented pottery from Nuremberg as some think, or as others suppose from Italy, he resolved to discover the method of enamelling which had been brought to such perfection in the latter country. Regardless of expense, labor, disappointment, and hardship, he reduced himself and family to poverty rather than give up his undertaking, and about 1555 succeeded after 16 years of exertion. Having in the mean time become a Protestant, he was imprisoned at Bordeaux during the reign of Henry II.; but through the intervention of some of the nobility, among others the constable de Montmorency, he was released, and appointed "maker of the king's rustic potteries" (*rustiques figulines*). He removed to Paris, and resided in the neighborhood known as the Tuileries. On the building of the palace of the Tuileries he had charge of the decoration of the gardens. This post saved him from the massacre of St. Bartholomew. He improved his discovery, and manufactured earthen figures and ornaments, which in artistic perfection rivalled those of Faenza or Castel Durante, and were generally used in the decoration of castles and palaces. His other works, such as vases, jugs, ewers, and salvers, were eagerly sought for, and are still highly valued. Meanwhile he was engaged in scientific pursuits, and it has been appropriately said that he was to chemistry what Lord Bacon was to philosophy, and that his *Traité de l'art de terre* is the *Novum Organum* of the science. In his other treatises, *De la marne*, *De la nature des eaux et fontaines*, &c., anticipating modern scientific discoveries, he expounded a method of taking soundings, and gave the theory of artesian wells and stratifications. Toward the end of the reign of Henry III. he was again involved in serious difficulties on account of his religion. Probably through the enmity of the leaguers, he was arrested in 1588 and confined in the Bastile, where he died.—The name of Palissy, scarcely noticed by his contemporaries and completely ignored during the 17th century, was brought again to light by Fontenelle, Buffon, and others, who pointed out the value of his scientific researches. Being ignorant of Greek and Latin, he wrote altogether in French. An edition of his works was published in 1777 by Faujas de St. Fond and Gobet, and reprinted in part in 1844 by A. Cap (Paris). J. Salles has written *Étude sur la vie et les travaux de B. Palissy* (8vo, Nîmes, 1855), and his life has also been written by H. Morley (2 vols., London, 1852). Specimens of his art are preserved in the museums of the Louvre, of Sèvres, of the hôtel Cluny in Paris, and of the Favorite near Munich. His oven, with some other relics, was discovered in 1865 in the place du Carrousel.

PALK STRAIT. See CEYLON.

PALL, or Palla. See PALLIUM.

PALLADIO, Andrea, an Italian architect, born in Vicenza, Nov. 30, 1518, died there in August, 1580. He was brought into notice by his design for the *loggie* or open porticoes surrounding three sides of the palazzo della Ragione at Vicenza, after which he was for many years busily employed in the construction of private mansions, developing the still popular Palladian style. The most famous is the Rotonda Capra, known as Palladio's villa, just outside of Vicenza. After a time he was invited to Venice, where he designed two churches, San Giorgio Maggiore and Il Santissimo Redentore, as well as the atrium for the convent della Carità and the façade of San Francesco della Vigna. He also designed the Palazzo Barbaro at Maser in the Trevigiano, and a palace at Montagnana for Francesco Pisano. His last work was the Teatro Olimpico at Vicenza, which has been the subject of very conflicting criticisms; it was not finished until after his death. He wrote a treatise on architecture (fol., Venice, 1570), several times reprinted in costly style.

PALLADIUM, in Greek legends, a wooden image of Pallas or Minerva, thrown down to earth by Jupiter. It fell in the neighborhood of Troy, where Ilus the founder of that city, who had just prayed for favorable omens, regarding it in that light, took possession of it and built for it a sanctuary. It was a tradition that Troy could never be taken while this image remained in the city, and therefore Ulysses and Diomedes were commissioned to steal it, and succeeded. There are numerous other accounts of its fate.

PALLADIUM, a metal of the platinum group, discovered by Wollaston in 1803. It is sometimes found pure in small quantities in the form of octahedrons, mixed with grains of platinum in Brazilian ore, but usually as an alloy. It exists in platinum ore from the Ural and Santo Domingo, and it is also found, mixed with gold and selenide of lead, in the Hartz, and in auriferous ore from Zacotinga and Coudonga in Brazil, mixed with specular iron. It is also alloyed with gold and silver in the *oro pudre* of Porpez, Brazil, often amounting to 10 per cent. It is extracted from platinum ore by digesting this in nitro-muriatic acid, precipitating the platinum from the decanted liquor by chloride of ammonium, and the palladium from the filtrate by cyanide of mercury, and then calcining the cyanide thus obtained. From the pallado-auriferous ore of Brazil it is extracted by fusing this with an equal weight of silver and some nitre, which reduces the baser metals and earthy parts to slag. The alloy is cast into bars and again fused in black-lead crucibles with an equal weight of silver, so that the gold shall amount to one fourth of the mixture. This alloy is then granulated by pouring it into water through a sieve, when it is heated with twice its weight of equal quantities of nitric acid and water, the liquor decanted, and the residue boiled with pure nitric acid in quantity equal to two thirds the weight of granules used. From these nitric acid solutions the silver is precipitated by common salt, and the palladium and copper from the filtrate by zinc, in wooden vessels. The resulting black powder is dissolved in nitric acid, the solution supersaturated with ammonia, and the filtrate from this saturated with hydrochloric acid, which precipitates the greater part of the palladium as a yellow ammonio-protochloride, which is then washed in cold water and reduced to a metallic state by ignition. The remainder of the palladium and the whole of the copper may be precipitated from the hydrochloric acid solution by iron.—The symbol of palladium is Pd: its atomic weight, 106·5; sp. gr., 11·4 to 11·8. It is the most fusible of all the metals of the platinum group, beginning to fuse in the forge, and easily melting before the oxyhydrogen blowpipe at 2,480°. Its color is intermediate between silver and platinum. When obtained from the cyanide, or from the ammonio-protochloride by ignition, it has the form of a spongy gray mass, which when finely divided floats on water, and has a blood-red color by transmitted light. It is dimorphous, having the form of cubes and octahedrons, and also of six-sided tables, with cleavage parallel to the terminal faces. It is about as hard as platinum, but somewhat less ductile. When heated on lime to the melting point of iridium, it volatilizes in green vapors, which condense to a bistre-colored dust of metal and oxide. It oxidizes at a lower temperature than silver, and is easily oxidized by hydrated alkalies. Its alloys with iron, tin, lead, arsenic, and bismuth are very fusible and brittle. With twice its weight of silver it forms a ductile alloy not liable to tarnish, and well adapted for the construction of small weights. Palladium is also used for the construction of graduated scales for astronomical instruments. Its alloy with gold is hard, and remarkable for its whiteness. With mercury it forms a fluid amalgam. Palladium has the remarkable property of absorbing many times its volume of hydrogen, yielding it again at a high temperature, and was employed by Graham in experiments on the occlusion of hydrogen. Palladium foil heated for three hours between 195° and 106° F. absorbed 643 volumes of hydrogen; and if the metal after having been heated to redness was allowed to cool *in vacuo*, it absorbed at common temperatures 376 volumes of the gas. No alteration was produced in the metallic appearance of the foil. Spongy palladium absorbed 686 volumes of hydrogen, but no oxygen or nitrogen. When a wire of the metal is made the negative pole of a voltaic cell decomposing water acidulated with sulphuric acid, a still greater quantity of hydrogen can be absorbed, as much as 936 volumes to one of palladium, the metal increasing in bulk from 100 to nearly 105 volumes, or 16 times as much as if heated from 32° to 212°. When the galvanic current is reversed, and the piece of palladium becomes the positive pole, the hydrogen is rapidly converted into water by union with the nascent oxygen; and by applying a clamp with a movable index, the expansion and contraction of the metal on changing the current can be easily observed.—Palladium, like platinum, forms two classes of compounds: the palladious compounds, in which it is bivalent, and the palladic, in which it is quadrivalent. The dichloride, or palladious chloride, $PdCl_2$, is obtained by the action of nitro-muriatic acid. The tetrachloride or palladic chloride exists only in solution and in combination with alkaline chlorides. It is formed by digesting the dichloride in nitro-muriatic acid, has an intense brown color, and is decomposed by evaporation. Palladious iodide is precipitated from the chloride or nitrate, as a black mass, by soluble iodides. Palladium salts are employed for the quantitative analysis of iodine, as chlorine and bromine are not precipitated by them. The oxides of palladium are the monoxide, or palladious oxide, PdO, and the dioxide or palladic oxide, PdO_2. The latter is not obtainable in a separate condition, but exists as a hydrated palladic oxide, which obstinately retains a portion of alkali when precipitated from solutions of palladic chloride by the action of alkalies. There are three sulphides, PdS, PdS_2, and Pd_2S. Palladious nitrate has the form of rhombic prisms, soluble in a small quantity of water, but decomposing and forming a basic nitrate in a large quantity. The other salts are of little interest.

PALLADIUS. I. Surnamed **Sophista** or **Iatrosophista**, a Greek medical writer, of whose life nothing is known except that he must have flourished between the 2d and 9th centuries. He wrote commentaries on the works of Hippocrates "On Fractures" and "On Epidemics," and a treatise "On Fevers," all of which are extant. **II. Rutilius Taurus Æmilianus,** a Roman writer on agriculture, who lived about the middle of the 4th century A. D. His treatise *De Re Rustica*, in 14 books, was very popular in the middle ages. There is an English translation by Thomas Owen (London, 1803). **III.** An early Christian father, born probably in Galatia about 367. At the age of 20 he set out on foot to visit the solitaries of Upper Egypt, Libya, Syria, Palestine, Mesopotamia, and Italy. In 400 he was appointed bishop of Helenopolis in Bithynia, whence he was translated about 20 years afterward to the see of Aspona in Galatia. He was an adherent of Origen. He wrote a collection of biographical notices and anecdotes, generally known as "the Lausiac history," from being addressed to Lausus, a chamberlain at the imperial court. It was imperfectly edited by Meursius (Leyden, 1616). A better edition is contained in the *Auctarium* of Fronto Ducæus, vol. ii. (Paris, 1624).

PALLAS. See MINERVA.

PALLAS, Peter Simon, a German naturalist, born in Berlin, Sept. 22, 1741, died there, Sept. 8, 1811. He studied medicine, but afterward devoted himself to natural history, and after a year's residence in England settled at the Hague. In 1766 he published *Elenchus Zoophytorum* and *Miscellanea Zoologica*, and in 1768 became professor of natural history in the imperial academy of sciences in St. Petersburg. The same year he joined a scientific expedition to observe the transit of Venus and to explore the countries visited. He traversed a considerable part of southern Russia, the Caucasus, and central and southern Siberia, penetrating as far eastward as the frontiers of China, and returned in 1774. In 1777 he was appointed one of a commission to draw up a map of Russia. In 1795 he went to the southern part of the Crimea and built a handsome seat, in which he resided for 15 years; and in 1810 he removed to Berlin. Among his most important works are the *Spicilegia Zoologica* (2 vols. 4to, Berlin, 1767–'80); *Reisen durch verschiedene Provinzen des russischen Reichs* (3 vols. 4to, St. Petersburg, 1771–'6); *Novæ Species Quadrupedum* (4to, Erlangen, 1778–'9); *Sammlungen historischer Nachrichten über die mongolischen Völkerschaften* (2 vols. 4to, St. Petersburg, 1776–1802); *Nordische Beiträge*, *Neue nordische Beiträge*, &c. (7 vols. 8vo, 1781–'96); *Flora Rossica* (2 vols. fol., 1784–'8), never completed; *Bemerkungen auf einer Reise durch die südlichen Statthalterschaften des russischen Reichs in den Jahren* 1793–'4 (2 vols. 4to, Leipsic, 1799–1801; English translation, "Travels through the Southern Provinces of the Russian Empire," 2 vols. 4to, London, 1812); and *Zoographia Rosso-Asiatica* (3 vols. 4to, St. Petersburg, 1831). He assisted in preparing the vocabulary of all the languages of the empire, *Linguarum totius Orbis Vocabularia* (2 vols. 4to, St. Petersburg, 1786–'9; 2d ed., 4 vols., 1790–'91).

PALLAVICINO, Ferrante, an Italian author, born in Parma or Piacenza about 1615, executed at Avignon, March 5, 1644. He became an Augustinian friar, and at first was reputed one of the most devout and learned members of his convent; but falling in love with a fair Venetian, he plunged into a career of licentiousness, supporting himself for some time by writing immoral books. He afterward went to Germany as chaplain to the duke of Amalfi, but without interrupting his debaucheries, and on his return put secretly to press at Villafranca a satirical work entitled *Il corriere svaligiato*, to which the secretary of the Venetian republic had previously refused his imprimatur. The transaction being discovered, he was thrown into prison, but obtained his liberty mainly by the assistance of one of his mistresses. When the war broke out between Pope Urban VIII. and the duke of Parma, he wrote in favor of the duke, using the most violent expressions against the pope and his nephews the Barberinis, and among other pamphlets published *Il divorzio celeste*, in which he intimated that a divorce had taken place between Christ and the church. Afraid to remain in Italy, he resolved to visit France; but a fellow traveller betrayed him into the hands of the papal authorities at Avignon, and he was tried, condemned, and beheaded for apostasy and treason. His *Opere permesse*, edited by Brusoni with a life of the author (4 vols. 12mo), appeared at Venice in 1655, and his *Opere scelte* at Geneva in 1660.

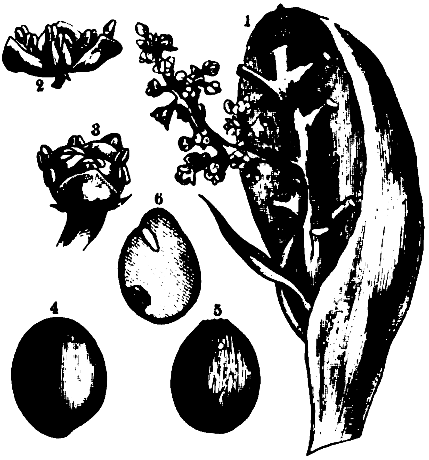
PALLAVICINO, Sforza, an Italian author, born in Rome, Nov. 20, 1607, died there, June 5, 1667. He was heir to a marquisate, but took orders, and about 1637 became a Jesuit. He was made cardinal by Pope Alexander VII. His principal work is *Istoria del concilio di Trento*, written to counteract the work of Paolo Sarpi on the same subject. The first edition (2 vols. fol., Rome, 1656–'7) is the best, and it has been frequently reprinted. Among his other works are: *Vindicationes Societatis Jesu* (Rome, 1649); *Gli avvertimenti grammaticali* (1661); and *Trattato dello stilo* (1662). The manuscript of his *Arte della perfezione cristiana* is in Parma.

PALLISER, Sir William, a British inventor, born in Dublin, June 18, 1830. He entered the army in 1855, and retired from it as major in 1871. He became known by the projectiles and guns which bear his name, the former used for piercing armor-plated ships, and the latter now generally introduced in the army. He improved the construction and rifling of cannon used in ironclads and on fortifications. He was knighted in 1873, and in 1875 received the cross of commander of the crown of Italy. —His brother JOHN (born Jan. 29, 1817) explored western America, and published in 1853 "Sporting Adventures in the Prairies." He conducted an expedition to the Indian country in 1856–'7, and was employed in 1857–'60 in determining the British boundary line from Lake

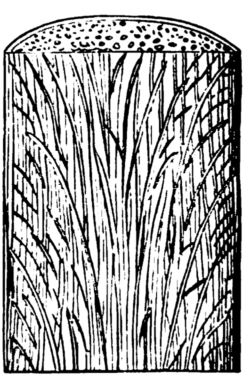
Superior to the Pacific. His report was published among the parliamentary papers of 1861.

PALLIUM, or **Palla**, an outer garment worn by both sexes among the Greeks, and occasionally among the Romans. It was a square or rectangular piece of woollen, linen, or cotton cloth, varying in color, texture, and ornament, and was sometimes merely wrapped around the body without regard to grace or appearance, sometimes fastened over the right shoulder with a brooch, and sometimes thrown over the left shoulder, brought across the back and under the right arm, and then thrown over the left shoulder again. The women's pallium was generally of a finer texture and more elaborate ornamentation than the men's; and the fops of ancient Athens used not unfrequently to array themselves in this effeminate costume. The pallium among the Greeks supplied the place of the toga among the Romans.—Pallium is also the name of an ecclesiastical ornament in the Roman Catholic church, reserved to archbishops who are not merely titular, and to bishops who are the occupants of privileged sees, or on whom it is bestowed as a mark of special distinction. It was originally a sort of mantle or cape, but at present it consists only of a white woollen band about 2 in. wide, which is worn around the shoulders and crossed in front. Crosses are worked upon it in black, and ornaments are attached to the ends. It is fastened by golden pins. The pallium is made at Rome of the wool shorn from two lambs which the sisterhood of Santa Agnese on the via Nomentana offer every year on their patronal feast while the *Agnus Dei* is sung at mass. It is sent by the pope to every newly appointed archbishop, and is considered the distinctive badge of the metropolitan dignity. The origin of the pallium as a badge of episcopal preëminence is obscure. The first ecclesiastical document relating to it is a constitution of Pope St. Mark (who died in 336) prescribing that the bishop of Ostia should wear the pallium when officiating as consecrator of a pope elect. The most ancient example of the pallium in monumental history is from the sarcophagus of St. Celsus, archbishop of Milan, who died in the 4th century; his pallium bears a single cross. A mosaic of the 8th century represents St. Peter bestowing on Pope St. Leo a pallium with one cross, and differing but little in shape from that in use at present. At the council of Lateran in 1215 Pope Innocent III. decreed it to be a mark of the plenitude of the apostolic power, and that no archbishop should exercise his functions until he had received it.

PALM (Lat. *palma*, the ancient name of the date tree), the general name of plants of the *palmaceæ* or palm family. The species of palms number nearly 1,000, which are distributed in more than 50 genera; as in other large families, there is great diversity among the genera, and these are grouped according to their affinities in five well marked tribes or subfamilies. The characters of the family in which all agree may be briefly stated. The palms are all perennial, woody, endogenous (monocotyledonous); the primary root of the seedling decays early, but secondary roots appear at the base of the stem, which form a compact mass, and sometimes so raise up the trunk that it seems to be supported upon props, as in *areca lutescens*, p. 17. The stem, sometimes a mere rootstock not rising above the surface of the earth, is sometimes short and swollen, but more frequently tall, slender, and erect, in some species reaching the height of 250 ft.; in the cane palms the stem is so weak and slender that it climbs trees and is over 300 ft. long; while a diameter of 3 ft. is reached by some, others are not larger than a small reed; the stem is generally simple, but in a few genera is branched in a forked manner; in two or three genera the stem is swollen near the middle. As in other endogens, a cross section of a palm stem shows no concentric circles of wood, but a mass of pith through which bundles of woody fibre are irregularly distributed, and these are more numerous toward the circumference than in the centre; as new leaves are formed these woody bundles extend from them down through the central portion of the stem, and finally curving outward lose themselves in the circumference. They have no proper bark, but the exterior

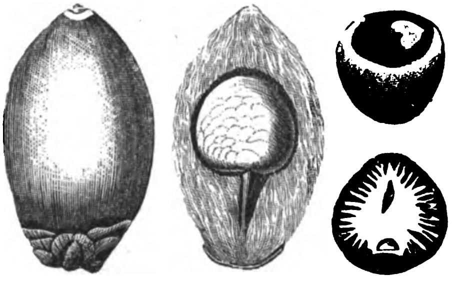


Inflorescence and Fruit of Palm.—1. Spathe and portion of spadix of Chamærops. 2. Staminate flower. 3. Pistillate flower. 4. Fruit. 5. Seed. 6. Seed cut vertically.



Palm Stem in Section.

portion or rind, by pressure of the interior growth and by an induration which takes place, similar to that in the heart wood of exogenous stems, becomes excessively hard, and in some cases almost impossible to cut with an axe. The leaves are from a terminal bud, the petioles sheathing the stem; after the decay of the leaf the sheathing portion of the leaf stalk remains, usually as a fibrous network; the blade of the leaf, often very large, is fan-shaped or pinnately divided, and presents a great variety of elegant forms; the margins, often depressed, are frequently split into slender filaments. The flowers are very small, rarely perfect, but usually monœcious or diœcious, and in axillary clusters upon a simple or branched spadix, surrounded by a herbaceous or almost woody spathe. The flowers of *chamærops excelsa* are used to illustrate the character of the inflorescence; in this the spathe or sheath to the flowers is small and sheath-like, but in some it is several feet long and woody; within the sheath is shown a portion of the branching spadix or stalk to the flower cluster, with some flowers attached, while separate flowers of both sexes are given at one side. The number of flowers produced by the palms is astonishing; 12,000 have been counted in a spathe of the date, and 207,000 in one of a species of *Alfonsia*. The perianth is double, and consists of a calyx of three distinct or coherent sepals, within which is a similar corolla; stamens three to six; ovary of one to three more or less united carpels, each with a solitary ovule, and becoming in fruit a berry or drupe, often with a fibrous covering; seed with a cartilaginous or horny albumen. Palms are mostly tropical, a few being found in the hotter portions of the temperate zones; lat. 44° N. and 38° S. are the extreme distances from the equator at which they have been found, and very few grow in these localities; one species is a native of southern Europe, and four are natives of our southern states. (See PALMETTO.) Great heat and abundant moisture are essential to their growth, and hence they are rare in the arid regions of the tropics; they are not numerous in Africa, but are abundant in India and tropical America. The palms rank in usefulness next to the grasses, there being scarcely a species which cannot be utilized in some manner: the wood serves to build houses, and the leaves to thatch them; almost all yield useful fibres, which may be used as textile material or for paper; mats, baskets, and numerous utensils are made from the leaves; besides their various edible fruits, they yield food in the form of starch, sugar, and oil, and in their undeveloped leaves; several produce alcoholic drinks by the fermentation of their sap.—In order to notice the many useful products of the family, it will be convenient to group the genera in their several tribes or subfamilies. 1. The areca tribe (*arecineæ*) consists of trees or shrubs with pinnate or bi-pinnate leaves, the pinnules with curved margins; the spathe, which is seldom wanting, is generally of several leaves, rarely monophyllous; the deeply three-lobed fruit is a berry or a drupe. The betel-nut palm (*areca catechu*), also known as areca-nut and catechu palm, and called pinang by the Malays, is a large tree growing in India, Ceylon, and the Moluccas; it has very fragrant flowers, which are used in Borneo for decorating, and a drupe-like nut about the size of a hen's egg, with a fibrous rind half an inch thick; the seed is about the size of a nutmeg, which it also resembles in the mottled appearance of its albumen; the nuts are very astringent; by boiling in water and evaporating the decoction a form of catechu is obtained; the nuts yield a charcoal which is sometimes used for tooth powder, but it differs from other coal only in its greater hardness; the principal use of the nuts is as a masticatory. (See BETEL.) The cabbage palm of the West Indies, *oreodoxa oleracea*, is so called because the terminal



Fruit and Nut of Betel Palm, entire and in section.

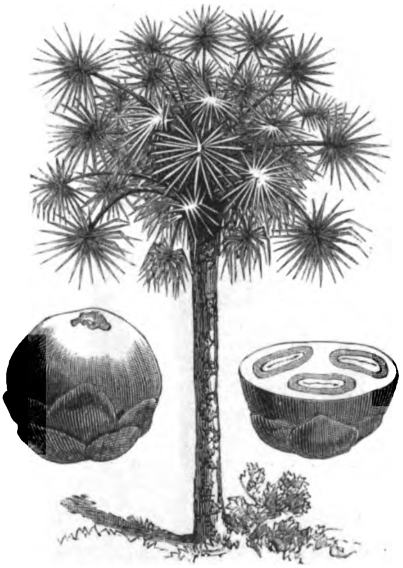
Areca lutescens.—A young specimen in pot, to show the ornamental character of small palms.

bud, consisting of closely packed, undeveloped leaves, is used as a table vegetable, and is regarded as a delicacy; in order to obtain this, a noble tree over 100 ft. high is sacrificed; the terminal bud in many other species is used in the same manner. The young unexpanded flower spikes of species of *chamædorea* are used as a vegetable in Mexico, and the natives of New Zealand make a similar use of those of *Kentia sapida*, both of this tribe, and the last named interesting as being found further south than any other palm, in lat. 38° 22′. Several species of the South American genus *œnocarpus* have fruits with an oily flesh, and the oil obtained from them is used for cooking and for lamps; it is said to be mixed in Pará with olive oil as an adulteration; the stiff nerves of the leaves of these palms furnish the Indians with arrows for their blow-guns, which are made by boring the leaf stalks of other palms of this tribe. The East Indian genus *caryota*, which includes lofty trees of great beauty, furnishes various useful products; palm wine and sugar are obtained from the flower spikes, the trunks yield a good sago, and the leaves furnish a fibre of great strength called *kittul*, used for making ropes and mats. The species of this genus are favorites in cultivation, as this is one of the few with bi-pinnate leaves. When the tree has completed its growth, the flowers are produced in drooping tassels; a flower cluster is produced at the base of the uppermost leaf, then one appears at the next lower leaf, and so on until the lowermost leaf has produced a cluster from its base, when the plant dies. The wax palm of Colombia, *ceroxylon andicola*, is a lofty tree growing in elevated regions; it is remarkable for its swollen trunk, which is larger in the middle than it is above or below, and is covered with a whitish wax-like substance, which is collected by felling the tree and scraping; the product of each trunk is about 25 lbs.; it consists of a resin and a wax, and, though too inflammable to be used by itself, it makes good candles when mixed with tallow. 2. The calamus tribe (*calameæ*) consists of sarmentose or runner-like plants and some trees; the pinnate or fan-like leaves are often terminated by a long appendage which is furnished with hooks; the spathe is usually several-leaved, and the fruit a berry covered with overlapping scales. The principal genus is *calamus*, of which more than 80 species are described, all natives of Asia, especially the Malayan peninsula, save one in Africa and two in Australia. They are known as rattan and cane palms, the stems of several being found in commerce under these names. Some are low bushes, while others, with stems seldom over an inch thick, climb to a great distance over trees, to which they cling by means of the hooked spines upon their leaf stalks. Some remarkable stories have been told of the great length of these stems; Rumphius's statement that they grow from 1,200 to 1,800 ft. long has not been verified, though it is not rare to find them 300 ft. long. Their leaves are mostly pinnate, with the leaf stalk prolonged into a long whip-like tail; the rose-colored or greenish flowers are in long branching spikes, and the fruit consists of a single seed, surrounded by an edible pulp, which is enclosed by a covering of shiny scales. The stems of these palms are used in their native countries for numerous purposes; they make ropes of great length and strength, used in catching elephants and as cables for vessels; in the Himalaya the stems are used for building suspension bridges. The rattans of commerce are afforded by *calamus rotang*, *C. verus*, *C. rudentum*, and others; they are cut 12 or 16 ft. in length, once doubled, and made into bundles of 100 each; immense num-

Toddy Palm (Caryota urens).

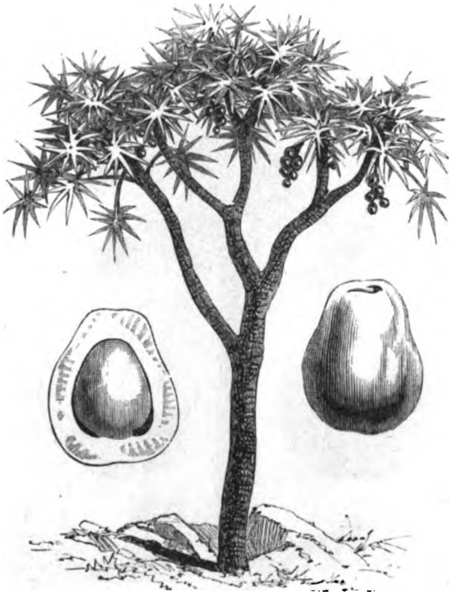
Rattan Palm (Calamus rotang).

bers of these canes are imported into Europe and America, and as new uses are constantly found for them, the consumption rapidly increases. The ease with which they are split, and the strength of very small splints, adapts them to a great variety of wares. One of their commonest uses is to make chair bottoms; chairs are often made entirely of rattans, the whole canes forming the framework, which is filled in with a fabric of split ones; sofas and lounges are made largely of rattans, as are the bodies of fancy carriages; the whole canes are used for making baskets requiring great strength, while the split canes are woven into the most delicate work baskets for ladies. The Malacca canes, highly esteemed as walking sticks, are the stems of *C. Scipionum*, the joints of which are so far apart that a good cane may be made from a single internode; they have a rich reddish brown color, which is due to their being smoked and varnished with the bark on. A portion of the resinous drug dragon's blood is obtained from the fruit of *C. Draco*, a species which some botanists place in the genus *dæmonorops*. The sago of commerce is mainly furnished by species of *sagus*, but the pith of other genera affords this form of starch, some of them in sufficient quantities to supply the inhabitants of the countries where they grow with an important share of their food. (See Sago.) The remaining genus of this group, valuable for its products, is *mauritia*, the moriche or Ita palm of tropical South America. *M. flexuosa*, especially abundant on the Amazon and other rivers, supplies nearly all the wants of the natives; during the great inundations they even suspend their dwellings from the trunks; the skin of the young leaves is spun into cord for making hammocks, the trunk supplies sugar in abundance, and both the sap and the fruit are converted into intoxicating beverages. 3. The borassus tribe (*borassineæ*) consists of trees with fan-shaped or pinnate leaves; a woody, fibrous, or (in one genus) net-like spathe, and the fruit a drupe. The principal genus *borassus* consists of only two species, one of which, *B. flabelliformis*, is the magnificent Palmyra palm, found throughout tropical Asia, and celebrated for the great number of its useful products. Its trunk, from 60 to 80 and even 100 ft. high, and 2 ft. in diameter at base, bears a magnificent crown of leaves of a circular fan shape, which including the petiole are 10 ft. long; these are used to thatch houses, to cover floors and ceilings when plaited into mats, and to form a great number of useful articles, from bags and baskets to umbrellas and hats; they also serve as paper, which is written upon with a style; all the important books in Cingalese relative to the religion of Buddha are written upon the laminæ of this palm. The fruit is in bunches of 15 or 20, about the size of a child's head, and contains three seeds as large as a goose's egg; the albumen of these is edible when young, but in the ripe seed it is horny; the coating surrounding the seeds is a thick fibrous pulp, which is roasted and eaten; the young seedlings of this tree are cultivated as an article of food, to be eaten in the green state, or they are dried and made into a coarse meal, which is regarded as very nutritious. The most important products of this palm are palm wine (*toddy*) and sugar (*jaggery*); these are yielded by many other species and in other countries, but the methods of obtaining them are essentially the same. When the flower spike makes its appearance, the operator ascends the tree by the aid of a vine or rope passed loosely around his own body and that of the tree; he ties the spathe securely, so that it cannot expand, and beats the base of the spike with a short stick; this beating, which is supposed to determine a flow of sap toward the wounded part, is repeated for several successive mornings; a thin slice is removed from the end of the spathe; about the eighth day the sap begins to flow, and is caught in a jar; the daily flow is two pints or more, and continues for four or five months, the jar being emptied every morning, and a thin slice being at the same time removed from the end of the spathe. This juice readily ferments, and is then palm wine or toddy, which is drunk in that state or is distilled to separate the spirit, known as arrack; if allowed to pass into the acetous fermentation, toddy is converted into vinegar. When sugar is to be made from the juice, it is collected several times a day, and the receiving jars are cleansed with lime to prevent fermentation; it is boiled down and treated in the same manner as cane juice. The remaining species, *B. Æthiopum*, of the central part of tropical Africa, furnishes products similar to those of



Palmyra Palm (Borassus flabelliformis).

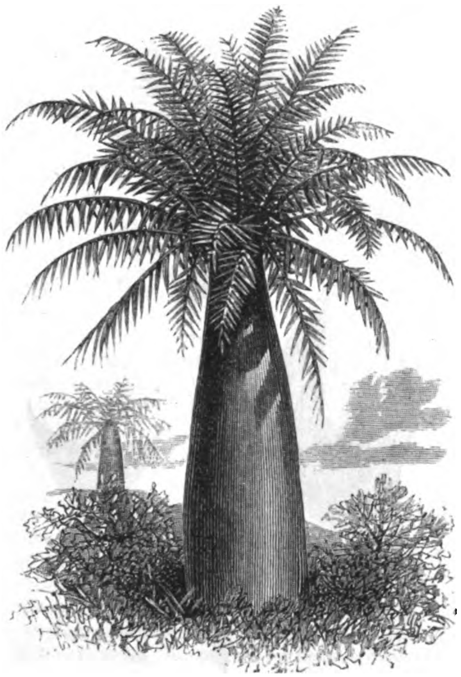
the Asiatic species, but it is said that the natives are not acquainted with the process of extracting toddy. The doum palm of Egypt, which also grows in Arabia and Abyssinia, is *hyphæne Thebaica* (or *cucifera*); the genus is remarkable among palms in having branching stems; in the doum palm the trunk is seldom over 30 ft. high; it is simple when young, but in old trees forked three or four times, each branch being terminated by a tuft of large, fan-shaped leaves. The fruit is produced in large clusters of over 100, each the size of an orange, irregular in shape, with a highly polished yellowish brown rind, enclosing a single horny seed; the rind, which is dry, fibrous, and mealy, is said to taste exactly like gingerbread, and, though unpalatable from its dryness, forms a common article of food among the Arabs. The double or sea cocoanut was long a great puzzle to naturalists; its large deeply lobed nuts, appearing like two cocoanuts joined for about half of their length, were occasionally picked up at sea; their origin being unknown, they were in olden times invested with remarkable virtues; the albumen or meat of the nut was regarded as a preventive of various diseases, and the shell, used as a drinking cup, imparted similar power to the liquid it contained; enormous prices were paid for single specimens, and they were regarded as among the most costly of regal gifts. With the exploration of the Seychelles islands in 1743, the source of this "wonderful miracle of nature, the most rare of marine productions," was ascertained; it is the fruit of a palm, growing only on the two small islands Praslin and Curieuse, which was named by La Billardière *Lodoicea Sechellarum*. The tree is diœcious, of slow growth, the males attaining 100 ft. in height; it does not blossom until 30 years old, and the fruit is 10 years from that time in maturing; the fruits are borne in clusters of 5 to 11 upon a strong zigzag stalk, and average about 40 lbs. each; they have a tough fibrous husk, which encloses usually one, but sometimes two or three nuts; the nuts serve to make various domestic utensils, and the leaves afford material for the most delicate baskets, bonnets, and articles of fancy work; the wood is valuable, and houses are made of the large leaves. It is feared that the felling of the trees to obtain the nuts, as well as the bud or "cabbage," will before long cause this remarkable species to become extinct. The bossu of the natives of the southern Amazon is *manicaria saccharifera*, the only species of the genus, and grows in the tidal swamps; this is distinguished from other palms by its entire leaves, only occasionally divided when old by splitting; they are frequently 30 ft. long, 4 or 5 ft. wide, and strongly furrowed from the midrib to the margin; these leaves are used for roofing huts. The spathes of this palm are fibrous, and when cut around at the base of the flower cluster, they may be pulled off entire. The spathe is dark brown, and its very strong fibres are so interwoven that it may be stretched to several times its proper diameter without tearing, and forms a very serviceable seamless bag; or if cut, it may be used as a coarse cloth. 4. The tribe *coryphineæ* consists of trees or stemless plants with fan-shaped, rarely pinnate leaves, the pinnules with erect margins; spathes rarely perfect; flowers usually perfect, sometimes polygamous; fruit a berry. The genus *corypha* includes several stately species, one of the best known being the talipot palm (*C. umbraculifera*) of Ceylon and other parts of the East; its magnificent leaves are remarkable for their regular plaiting, and form a fan which is nearly a complete circle 4 ft. or more in diameter; the numerous segments are split, and form a double fringe to the margin. These leaves require little preparation to make the



Doum Palm (Hyphæne Thebaica).

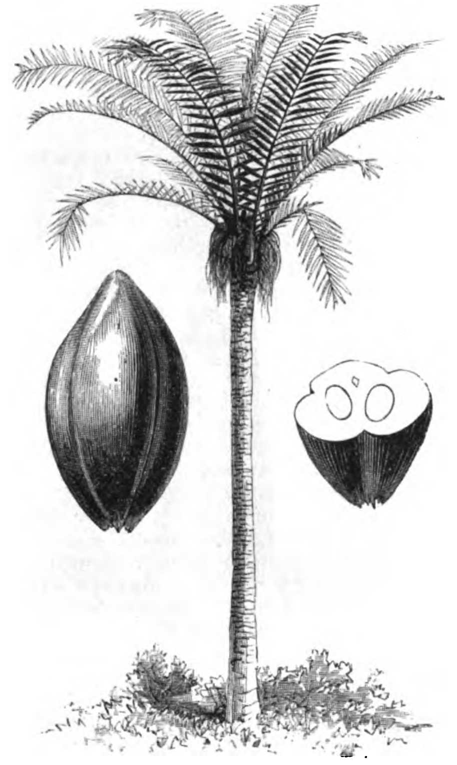
Hardy Palm (Chamærops excelsa).

fans used by the Cingalese as emblems of rank; they are put to many other of the uses of palm leaves, including the making of paper. The trunk yields sago. The tura palm of Bengal (*C. taliera*) and the gebang palm of Java (*C. gebanga*) are both useful in various ways. The wax palm of Brazil, *Copernicia cerifera*, bears upon its young leaves a coating of wax; this is collected by shaking the leaves, melted, and run into moulds; it is harder than beeswax, but no method of depriving it of its yellow color having been discovered, its use in candle making is limited. A kind of cane was known in commerce as Penang lawyers a long time before its origin was ascertained; it is now known to be the stem of a small palm of this group, *licuala acutifida*, of the island of Penang; the stem is seldom much more than 5 ft. high, and has a diameter of an inch; the canes are prepared for walking sticks by scraping the surface and polishing. The genus *chamærops* is noted as being the northernmost of the palm family; one species, *C. humilis*, grows wild in southern Europe as far as Nice; another (*C. excelsa*) is found in Asia as high as lat. 44° N.; and one of our southern palms belongs to this genus. (See Palmetto.) The most important tree of this tribe is the date palm, *phœnix dactylifera*. (See Date.) 5. The fifth tribe, *cocoineæ*, includes both large and small trees, some with thorny trunks; the leaves are pinnate, the pinnules with their margins turned downward; the flowers at first enclosed in a spathe; fruit a drupe, with its exterior portion (sarcocarp) fibrous or oily, the inner portion (endocarp) thick and woody, with three scars, from one of which the embryo issues; seed oily. This tribe takes its name from its most important genus, *cocos*, of which there are about a dozen species, including *C. nucifera*, the cocoanut palm. (See Cocoanut Tree.) The peach palm, *Guilielma speciosa*, a native of Venezuela, and cultivated in other parts of South America, is a lofty tree, its stem armed with sharp small spines; its fruit, borne in large clusters, is about the size of an apricot, pear-shaped, and scarlet and orange-colored when ripe; the outer portion abounds in starchy matter, and when roasted is said to taste much like the potato; it forms a considerable portion of the food of the natives, who also ferment the fruit with water and prepare an alcoholic beverage. The trees of the genus *Maximiliana* form a striking feature in South American scenery; the Inaja palm of the Amazon, *M. regia*, reaches over 100 ft., and has a crown of immense leaves, which are 30 to 50 ft. long; the spathes are 5 or 6 ft. long, woody, and about 2 ft. broad, tapering at each end to a narrow point; these are used as packages in which to keep and transport flour and other articles, and will resist the action of heat sufficiently to serve as cooking utensils. The coquita palm of Chili is *Jubæa spectabilis*, one of the most southern species, and furnishes the palm honey so much used by the Chilians; this is obtained by felling the tree, removing the crown, and catching the sap which runs from the wound; the flow is kept up by removing a thin slice of the end each day, and it continues for several months, each trunk yielding about 90 gallons; the sap is boiled down to the consistence of molasses, and used as a substitute for sugar; the small nuts of the tree are edible, and are a considerable article of export to other parts of South America. They are deprived of their husks in a singular manner; cows and oxen, which are very fond of the green husks, are allowed to feed upon the nuts; they only masticate the husk and swallow the nuts whole; when afterward they chew the cud they reject the nuts, and when the animals have finished ruminating these are found deposited in small heaps, perfectly free from the husk. The piassata of Brazil, *Attalea funifera*, furnishes a strong and valuable fibre in the decayed bases of the leaf stalks; it is also called monkey grass and Pará grass, and is used for various purposes; each fibre is the size of a small quill, smooth and stiff; considerable quantities are sent to England, where it is made into coarse brooms; the brushes of street-cleaning machines are made of it. The fruit of this is different from that in any of the allied genera, it being three-celled and three-seeded. The nuts are an article of commerce, and known as coquilla nuts; they are oval, about 3 in. long, of a rich brown color, and have an extremely hard and bony texture;



Coquita Palm (Jubæa spectabilis).

they are used for making knobs and other small wares, similar to those made from vegetable ivory. The vegetable ivory nut was long regarded as the product of a palm, but the plant of which it is the fruit is found to belong to a different family. (See Phytelephas.) One of the most important products of this family is palm oil, which is obtained from the fruit of *elæis Guineensis* of western Africa, where it grows in immense numbers; its trunk, seldom over 30 ft. high, is covered with the remains of dead leaves, and surmounted by a tuft of long, pinnate leaves, with prickly petioles. The flowers are usually diœcious, densely crowded in clusters, and in the females succeeded by a cluster 1½ to 2 ft. long, in which the fruit is so compactly crowded that the cluster has been compared to a large pineapple; the individual fruits are an inch and a half long, somewhat pear-shaped, and bright red; they consist of an outer fleshy portion containing the oil, and within, forming about one fourth of the whole, a hard stone from which an oil may also be extracted. (See Palm Oil.) A closely related species of *elæis* (*E. melanococca*) is found in South America.—In this review of the great palm family only the species most valuable to man have been mentioned; there are but few which may not be made useful in some manner, and the various products afforded by those here referred to are to be found in môre or less abundance and perfection in a multitude of other species.—Palms are often cultivated in warm countries for their useful products, but in northern climates large specimens with their peculiar forms and strikingly tropical foliage can only be enjoyed, save in a few exceptions, under immense structures of glass; and on account of the great height which the trees attain, a palm house is only within the reach of the very wealthy. The most notable structure of this kind is that at Kew, England, where the house is 362 ft. long, 100 ft. wide, and 64 ft. high, but must soon be raised to allow of the development of the larger specimens. Palms of small growth and young plants of the larger are often found in greenhouses and stoves. Well developed plants of various species are much used for decorative purposes. Palms may be used with fine effect upon lawns and near the entrance to the house; but as the foliage may be injured by heavy winds, only the more robust kinds should be used for this purpose. Two species of *chamærops* are hardy in France and in portions of England; these, *C. excelsa* from Nepaul (see p. 16) and *C. Fortunei* of north China, also called Chusan palm, are of great value in subtropical gardening, as their large fan-shaped foliage is unlike that of any other plants. These withstand a cold considerably below 32°, and would be quite hardy in Virginia and southward; north of that they may be used for outdoor decoration if housed for the winter in a dry cellar or even in a barn.—In very early times the palm was recognized as a token of victory, and in a more general sense of honor and preëminence, a use still retained. The custom of carrying palm branches (which of course are properly leaves) on occasions of festivity was an ancient one among the Jews, and its observance on Christ's entry into Jerusalem is still commemorated in all Roman Catholic churches on the Sunday before Easter. A curious instance of the influence of religion upon horticulture is in the cultivation of date palms at Bordighera, near Mentone on the Mediterranean; the date is barely hardy in that locality, but is grown in considerable quantities for the purpose of supplying St. Peter's and other churches in Rome, of which it has the monopoly. The leaves of the date are no doubt the true palm branches of the Bible, but in other countries they are represented in the ceremony by such foliage as may be available at that season; in southern and middle Europe the olive is used, and further north the holly; in most parts of our northern states the branches of the hemlock (*abies Canadensis*) serve for palms, and when nothing else is obtainable sometimes the willow has been employed.—For an account of the palms of the East, reference may be made to Blume's *Rumphia* (fol., Amsterdam, 1835–'46), Royle's "Illustrations of the Bot-


Piassata Palm (Attalea funifera) and Fruit—Coquilla Nuts.

any of the Himalayas" (fol., London, 1839), and Griffith's "Palms of British East Indies" (8vo, incomplete, Calcutta, 1845). For the palms of tropical America, see Martius's *Genera et Species Palmarum Brasiliæ* (fol., Munich, 1823–'45), and his *Palmetum Orbignianum*, in vol. vii. of D'Orbigny's *Voyage* (4to, Paris, 1843-'6), and Wallace's "Palm Trees of the Amazon and Rio Negro" (8vo, London, 1853). Kunth, *Enumeratio Plantarum*, vol. iii. (8vo, Stuttgart, 1841), gives a systematic arrangement of all the species known at that time. A very full description of the family, with copious illustrations of the structure, is given in Maout and Decaisne's "General System of Botany," translated by Mrs. and edited by Dr. J. D. Hooker (4to, London, 1873). For instructions in the cultivation of palms see "Choice Stove and Greenhouse Ornamental-leaved Plants," by B. S. Williams (12mo, London, 1870).

PALM, Johann Philipp, a German publisher, born at Schorndorf, Bavaria, in 1766, executed at Braunau, Austria, Aug. 26, 1806. In 1806 he received for transmission, in the course of his business as a bookseller at Nuremberg, a pamphlet entitled *Deutschland in seiner tiefsten Erniedrigung* ("Germany in her Greatest Degradation"), which reflected severely upon Napoleon, and particularly upon the French troops stationed in Bavaria. The emperor caused him to be arrested and conveyed to Bernadotte's headquarters at Anspach, and next to Braunau, where he was put to death. A subscription was raised for his family, and his biography was published in Munich in 1842.

PALMA, the capital of the Spanish island of Majorca, in the Mediterranean, in lat. 39° 34′ N., lon. 2° 45′ E.; pop. about 50,000. It is situated on the S. W. coast, at the head of the bay of Palmas, which here forms a fine harbor, on the slope of a hill, with the large cathedral towering over the houses and fortifications. It is surrounded by a wall 36 ft. thick, with 13 bastions and 8 gates. It is regularly built, and has handsome streets and promenades. It is the seat of the captain general of the Balearic islands, and of a bishop. Among the principal buildings are the captain general's palace, the exchange, the city hall, and several churches and convents. The public institutions embrace a naval school, a seminary, a theatre, and several hospitals. Wool and silk are manufactured, and cordage for the entire Spanish navy is now made here, with fibre imported from Manila. To the Vienna exhibition in 1873, 29 kinds of wine and a great variety of natural and industrial productions were sent from Palma, which took 49 prizes and diplomas. The total value of exports to foreign and domestic ports in 1873 was $6,076,340. The first railway in the island of Majorca was opened from Palma to Inca, Feb. 24, 1875.

PALMA. I. Jacopo, the elder, an Italian painter, born near Bergamo, about the close of the 15th century, died, according to Vasari, at the age of 48. He was educated in the school of Venice. His pictures are esteemed for composition and expression. **II. Jacopo**, the younger, grandnephew of the preceding, born in Venice about 1544, died in 1628. He was sent by the duke of Urbino to Rome, where during a residence of eight years he studied the antique and the works of Raphael and Michel Angelo. Returning to Venice at the age of 24, he found the public favor and employment engrossed by Tintoretto and Paul Veronese; but after their death he was without a rival in Venice. Examples of his best style are the "Plague of the Serpents" in the church of San Bartolommeo, and the "Assumption of the Virgin" in the Ospitaletto. His later works were very carelessly executed. He also made etchings.

PALMA, San Miguel de la, an island of the Canary group, about 50 m. W. of Teneriffe; area, about 300 sq. m.; pop. about 34,000. It is traversed by two mountain masses, divided by a depression 4,600 ft. above the sea, and reaching at their highest points about 7,000 ft. In the most northerly summit, rather resembling a truncated cone, is a vast and deep crater called La Caldera, 4½ m. wide, and encircled by precipices varying from 1,500 to 2,000 ft. in vertical height. The exterior of the cone is gullied by deep ravines, and the lower portions of the flanks, as in the other mountains of the island, are covered with forests offering large quantities of building and cabinet timber. Pines, palms, and chestnut trees are especially abundant. Besides the perennial stream from the Caldera, there are few watercourses in the island, and there is a scarcity of fresh water, though there are many mineral springs. The few valleys and the lower portions of the coast are very fertile, producing the vine, many varieties of fruits, and the cactus on which the cochineal insect feeds. The sugar cane thrives on the elevated plain of Los Llanos. Wheat and other cereals are imported. The climate is mild and equable. The chief industries are the manufacture of ribbons, silk gloves, stockings, taffetas, and other tissues, and especially the fisheries on the coasts. The principal port is that of Santa Cruz, at the head of a fine bay on the E. side, with the best mooring ground in the Canaries. The exports amount to about $1,500,000 annually, mainly of cochineal of various grades.

PALMA CHRISTI. See Castor Oil.

PALMAROLI, Pietro, an Italian painter, born after 1750, died in Rome in 1828. He was the first to transfer frescoes from walls to canvas, and to his skill in the execution of this difficult process is due the preservation of Daniele da Volterra's famous "Descent from the Cross," accomplished in Rome in 1811. He restored innumerable beauties in obscured paintings. Prominent among these were Raphael's *Madonna di San Sisto* in the gallery at Dresden, and the fresco of the "Sibyls," by the same master, in the church of Santa Maria della Pace in Rome.

PALMAS, Cape. See CAPE PALMAS

PALMAS, Ciudad Real de las, a fortified maritime city of the Canary islands, on the N. E. coast of Grand Canary; lat. 28° 7′ N., lon. 15° 32′ W.; pop. about 14,500. It is situated on the river Angostura, at the head of a beautiful bay, and comprises an old and a new division. An aqueduct supplies the town with water. The chief public edifices are the cathedral, four churches, a convent (five others having of late years been appropriated to other purposes), the city hall, the court house (in the old inquisition building), a general and a foundling hospital, and a hospital exclusively for elephantiasis. There are a college, a seminary, and other schools. The climate is very mild and equable, the temperature varying annually from 68° to 90° F. The port, though not well sheltered, has a mole about 900 ft. long by 80 ft. wide, and is visited yearly by a large number of ships, the steamers averaging 100, and the sailing vessels 1,000. The annual value of the exports is about $1,800,000, chiefly in cochineal, and of the imports $2,000,000. The foreign trade is principally with Great Britain, Spain, and the Spanish West Indies. The chief manufactures are hats, woollens, linens, carpets, glass and earthern ware, with shipping tackle, chairs, &c.; and ship building and fishing are extensively carried on.

PALMBLAD, Vilhelm Fredrik, a Swedish author, born at Liljested, Dec. 16, 1788, died in Upsal, Sept. 2, 1852. He studied at the university of Upsal. In 1810 he bought the academic printing office, and began the publication of the "Phosphorus," in 1812 of the *Poetisk Kalender*, and in 1818 of the *Svensk Literaturtidende*, all of which periodicals had much influence in the development of Swedish literature, turning it from French to German models. In 1830 he was made vice president and subsequently president of the Swedish literary society, and in 1835 professor of Greek literature in the university of Upsal, and became editor of the biographical lexicon of distinguished Swedes, completed in 23 vols. in 1857. He wrote, besides other works, *Supplementa in Lexica Græca* (1822), and several novels, of which *Familjen Falkensvärd* (2 vols., Örebro, 1844–'5) and *Aurora Königsmark* are the most deserving of mention. One of his most important works was the uncompleted *Handbok i physiska och politiska Geographia* (5 vols., Upsal, 1826–'37). He also contributed to Ersch and Gruber's *Encyklopädie*, and to Brockhaus's *Conversations-Lexikon.*

PALMELLA, Dom Pedro de Souza-Holstein, duke de, a Portuguese statesman, born in Turin in 1786, died in Lisbon, Oct. 12, 1850. In 1814–'15 he represented Portugal in the congress of Vienna. In 1816 he became minister of foreign affairs in Brazil, in 1820 president of the regency of Portugal, and in 1823 minister of foreign affairs and marquis. In 1825 he was ambassador to England. In 1828 he adhered to Dona Maria, and the regent Dom Miguel sentenced him to death for high treason. Under the regency of Dom Pedro in 1832 he became premier, and shortly afterward was again ambassador to England. He returned to Lisbon with Villaflor in 1833, and in 1834 Dona Maria made him premier and raised him to the rank of duke. The insurrection of 1836 drove him into exile, but he returned in 1846.

PALMER, Christian von, a German theologian, born at Winnenden, near Stuttgart, Jan. 27, 1811. He completed his studies in Tübingen, became professor in 1852, and in 1853 was ennobled. In 1869 he was vice president of the national synod of Würtemberg, and in 1870 was elected to the diet. He is a representative of the so-called conciliatory theology. His principal works are: *Evangelische Homiletik* (Stuttgart, 1842; 5th ed., 1867); *Evangelische Katechetik* (1844; 5th ed., 1864); *Evangelische Pädagogik* (1852; 4th ed., 1869); *Evangelische Pastoraltheologie* (1860; 2d ed., 1861); *Die Moral des Christenthums* (1864); *Evangelische Casualreden* (4 vols., 4th ed., 1864–'5); and *Evangelische Hymnologie* (1865).

PALMER, Edward Henry, an English orientalist, born in Cambridge, Aug. 7, 1840. He graduated at Cambridge in 1867, accompanied the Sinai survey expedition in 1868–'9, and explored the land of Moab and other regions of the East in 1869–'70. In 1871 he became professor of Arabic at Cambridge. He has translated Moore's "Paradise and the Peri" into Persian, the Persian "History of Donna Juliana" into French, and various Persian poems into English. Among his prose writings are "The Negah, or South Country of Scripture, and the Desert of Et-Tih" (1871), and "The Desert of the Exodus: Journeys on foot in the Wilderness of the Forty Years' Wanderings" (1871).

PALMER, Erastus Dow, an American sculptor, born in Pompey, Onondaga co., N. Y., April 2, 1817. He was brought up to the trade of a joiner, and at an early age attracted attention by ingenious carvings in wood of natural objects, such as leaves and animals. At the age of 29, while working at his trade in Utica, incited by a cameo portrait, he procured a shell and made a similar head of his wife. The success of this work decided him, and after a few years' practice in cameo cutting he turned his attention to sculpture, having in the mean time settled in Albany. His first work in marble, an ideal bust of the infant Ceres, modelled from one of his own children, was exhibited at the New York academy of design in 1850. This was followed by two bass reliefs of "Morning" and "Evening," and a statue of life size representing an Indian girl contemplating a crucifix which she holds in her hand. Among his other statues in marble are "The Sleeping Peri," "The Little Peasant," "Memory," a full-length recumbent statue of a young girl, a monumental work in Grace church, Utica, and "The Angel at the Sepulchre," a statue of heroic size in the Albany rural cemetery, one of his best works. "The White Captive" is a nude figure of a young American woman, a captive to savages who have tied her to a tree. Among his works in bass relief are "Faith," "Immortality," "Sappho," "Peace in Bondage," "Good Morning," and "The Spirit's Flight." He has made many fine portrait busts, among others, of Alexander Hamilton, Washington Irving, Commodore M. C. Perry, E. D. Morgan, Moses Taylor, and Erastus Corning. He went to Paris in 1873 and modelled for the state of New York a statue of Robert R. Livingston, which was cast in bronze in Paris, and placed in the old hall of representatives at Washington in March, 1875. His most comprehensive design, representing the "Landing of the Pilgrims," including 16 statues of colossal size, is intended for the capitol at Washington. He still lives in Albany.

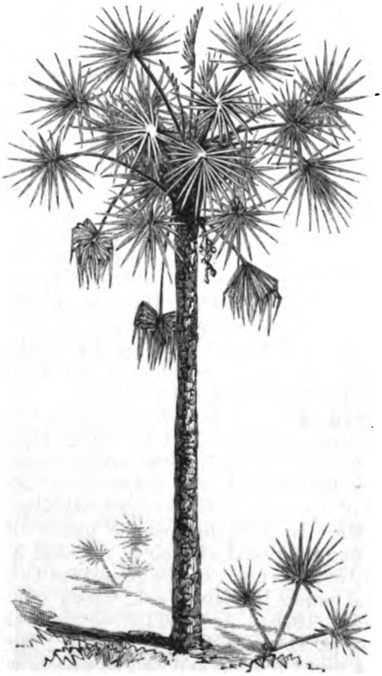
PALMER, John, an English clergyman, born in Southwark in 1729, died June 26, 1790. In 1759 he became pastor of a Presbyterian congregation in London, with which he remained connected till 1780, when, having married a lady of fortune, he retired from the ministry, and devoted himself to literary pursuits. In the latter part of his life he abandoned the doctrines of Calvin for those of Socinus. His principal works are: "Observations in defence of the Liberty of Man as a Moral Agent," in reply to Dr. Priestley's "Illustrations of Philosophical Necessity" (8vo, London, 1779); an appendix to that production, and a "Letter to Priestley" on the same subject; and a "Summary View of Christian Baptism."

PALMER, Ray, an American author, born at Little Compton, R. I., Nov. 12, 1808. He graduated at Yale college in 1830, studied theology at New Haven, and was ordained in 1835 as pastor of the central Congregational church in Bath, Me. In 1850 he became pastor of the first Congregational church in Albany, N. Y., and in 1866 secretary of the American Congregational union in New York, which office he still holds (1875). In 1852 he received the degree of D. D. from Union college. He has written many hymns and sacred poems which have gained a wide popularity, the best known being the hymn "My faith looks up to Thee." His principal works are: "The Spirit's Life," a poem (1837); "Spiritual Improvement" (1839), enlarged as "Closet Hours" (1851); "Doctrinal Text Book" (1839); "Hints on the Formation of Religious Opinions" (1860); "Hymns and Sacred Pieces" (1865); "Remember Me, or the Holy Communion" (1865); "Hymns of my Holy Hours" (1867); "Home, or the Unlost Paradise," a poem in four parts (1872); and "Earnest Words on True Success in Life" (1873).

PALMER. I. Roundell, Lord Selborne, an English statesman, born at Mixbury, Oxfordshire, Nov. 27, 1812. He was educated first at Rugby and Winchester, and graduated at Trinity college, Oxford, in 1834, as first class in classics, having previously gained several prizes, among which were those for Latin and English verse. He was chosen to a fellowship at Magdalen college, in 1834 obtained the Eldon law scholarship, and in 1835 the chancellor's prize for the Latin essay. He was called to the bar in 1837, and was made queen's counsel in 1849. He was returned to parliament in 1847 for Plymouth, was defeated in 1852, but was again returned in 1853, holding his seat until 1857. In 1861, having been knighted and made solicitor general, he was returned for Richmond, and in 1865 and 1868 was reelected. He was made attorney general in 1864, but went out of office in 1866 with the other members of the Russell administration. On Mr. Gladstone's accession in 1868, the chancellorship was offered to him; but he declined on account of his difference with the premier on the question of the disestablishment of the Irish church. In 1872 he was the counsel of the British government at the Geneva court of arbitration, and was soon after raised to the peerage under the title of Lord Selborne, and became lord chancellor, retiring in 1874 with the Gladstone ministry. He has edited "The Book of Praise, from the best English Hymn Writers" (London, 1862). **II. William,** an English clergyman, brother of the preceding, born July 12, 1811. He graduated in 1830 at Magdalen college, Oxford, where he became fellow, tutor, and public examiner. He subsequently took orders, travelled in the East, and endeavored to draw together the Anglican and oriental churches. In 1856 he joined the Roman Catholic communion. Besides several controversial pamphlets, he has published "Harmony of Anglican Doctrine with that of the East" (1844), and "The Patriarch and the Tsar," translated from the Russian (1871).

PALMERSTON, Henry John Temple, viscount, a British statesman, born in London, Oct. 20, 1784, died at Brockett Hall, Herts, Oct. 18, 1865. He succeeded to the title as third viscount (in the Irish peerage) in 1802, and after studying in the university of Edinburgh graduated at St. John's college, Cambridge, in 1806. In 1807 he was returned to parliament for Newport, Isle of Wight, and from 1811 to 1831 represented Cambridge university. He succeeded Lord Castlereagh as secretary at war in the Perceval cabinet in 1809, and held the office under five administrations, retiring with Huskisson from the Wellington cabinet in May, 1828. He soon afterward severed his connection with the tory party, and was secretary of state for foreign affairs under Earl Grey from November, 1830, to December, 1834, and under Lord Melbourne from April, 1835, to September, 1841. In July, 1846, he was again called to that post in the Russell cabinet; but offending the court and his colleagues by his friendly attitude toward the *coup d'état* of Louis Napoleon, he retired in December, 1851. In 1852 he became home secretary in the coalition ministry of Lord Aberdeen, whom he succeeded as prime minister in 1855. In 1857 the house of commons censured his China policy, but, the house having been dissolved, the new elections were in his favor. The defeat of the "conspiracy to murder bill," introduced with reference to the attempt of Orsini against Napoleon III., in February, 1858, occasioned his retirement. In June, 1859, he was once more premier, and held the post till his death. In 1861 he was appointed lord warden of the cinque ports, and governor of Dover castle. In 1862 he received the degree of D. C. L. from Oxford, and was elected lord rector of the university of Glasgow. He married the widow of Earl Cowper in 1839, but the union was without issue, and the title is extinct. He was buried in Westminster abbey, Oct. 27, 1865. A bronze statue of him was unveiled at Romsey in 1868, and another in Parliament square, London, in 1874. Politically, from his accession to office in the whig ministry in 1830 till his death, he was a prominent leader of the liberal party. He had previously supported Catholic emancipation. He was opposed to the settlement with the United States of the N. E. boundary, and stigmatized the treaty as the "Ashburton capitulation." In 1845 he declared in favor of the absolute repeal of the corn laws, though previously he was for a fixed duty for revenue. As minister of foreign affairs he directed the diplomacy of the country in many difficult and delicate questions, such as the troubles in Portugal, the Swiss troubles, the revolutionary movements of 1848, the Greek imbroglio (1847-'50), the Hungarian war and the protection of the refugee chiefs, and in securing the recognition of Napoleon III. and the subsequent coalition with France. Personally he was a man of extraordinary activity of mind and body, indefatigable in business, fond of the pleasures of society, and of great culture. He preserved his health and strength almost to the close of his life. His last illness resulted from exposure to sudden cold weather, and was brief and nearly painless. His views and opinions are to be found in detail in parliamentary reports and in his occasional addresses.—Multitudes of dissertations on the foreign policy of Lord Palmerston have been published, among the chief of which are the publications and speeches of David Urquhart accusing him of being secretly in the service of Russia and of betraying the interests of England in the eastern question, and Count Ficquelmont's *Lord Palmerston, l'Angleterre et le continent* (1852). More elaborate works are: "Opinions and Policy of the Right Hon. Viscount Palmerston as Minister, Diplomatist, and Statesman, with a Memoir by G. H. Francis" (1852), made up chiefly of extracts from his speeches; "Thirty Years of Foreign Policy, a History of the Secretaryships of the Earl of Aberdeen and Lord Palmerston" (1855); and "Life of Viscount Palmerston, with selections from his Diaries and Correspondence," by Henry Lytton Bulwer (3 vols., 1870-'74).

PALMETTO, the common name of the four species of palm indigenous to the United States, belonging to two genera of the tribe *coryphineæ*. (See PALM.) The largest species is the tall palmetto or cabbage palmetto, *sabal palmetto;* the meaning of the generic name does not seem to be understood. This grows from 20 to 50 ft. high and 12 to 15 in. in diameter; it is found along the coast from North Carolina to Florida, not far from salt water; its leaves are from 5 to 8 ft. long, fan-shaped, recurved at the summit, and usually shorter than the smooth concave petiole; the divisions are deeply cleft with thread-like filaments among the divisions; the flowers are perfect, followed by a small black drupe, less than half an inch in diameter. This tree is the emblem of the state of South Carolina. Its principal use is in the construction of wharves, for which in southern waters it is superior to all other wood, as it resists the attacks of the ship worm (*teredo navalis*), which so soon riddles and renders useless piles of other material; the logs do not splinter, and have been employed in the construction of forts, such as that on Sullivan's island. As with many other palms, the bud of this is eaten, and is by some highly esteemed, while others do not regard it as desirable where other vegetables can be obtained; however great a delicacy it may be, it should only be indulged in when the tree is felled for its timber, as the removal of the "cabbage" causes the death of the tree; palm wine or toddy has



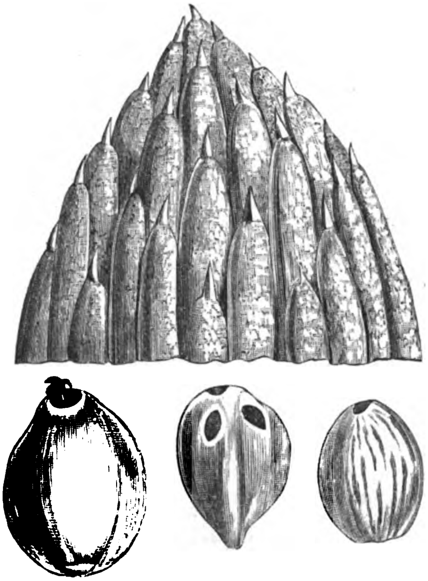
Cabbage Palmetto (Sabal palmetto).

been prepared from its juice. Blocks from the interior and softer parts of the stem are used in the southern states as a substitute for scrubbing brushes, the softer portions wearing away and leaving the hard fibres to act as a brush. The leaves serve for thatching out-buildings, and are woven into baskets and mats and plaited into hats, and the younger leaves afford material for light and delicate bonnets. The saw palmetto (*S. serrulata*), so called on account of the sharp spiny teeth along the edges of the petiole, has a creeping stem 4 to 8 ft. long, from which arise leaves 2 to 4 ft. high; these are circular, bright green, the erect divisions slightly cleft, without thread-like filaments; the fruit is about three fourths of an inch long, with a sweet pulp; it is said that the Indians use it as food, but in whites it causes purging and griping. The leaves, shred with a hatchel, boiled, and dried in the sun, make an excellent material for beds. It is said that the creeping stem, when grubbed up, dried, and burned, yields a greater amount of potash than any other vegetable substance. This species is common in sandy barrens from South Carolina southward. The dwarf palmetto (*S. Andersonii*) has its short stem wholly under ground; its leaves, 2 to 3 ft. high, are of a glaucous green, longer than the smooth petiole, with the numerous divisions slightly cleft at apex, with sparing filaments between them; the drupe is a third of an inch in diameter. It is found from North Carolina to Florida, sometimes, especially on some of the sea islands, quite covering sandy tracts. The chief use made of this is for fans, for which the leaves answer excellently; it is frequently called palmeet and palmeta. These three species were placed by older botanists in the genus *chamærops*, but the structure of their flowers refers them to *sabal.* We have, however, one *chamærops*, known as the blue palmetto (*C. hystrix*); this has a short creeping stem, with somewhat glaucous leaves 3 to 4 ft. high; at the bases of the leaves are numerous erect strong spines, like porcupines' quills, which serve to distinguish it from the other palmettos; the fruit is from one half to three fourths of an inch long. This does not appear to be put to any special use. It is found in the same states as the preceding, but prefers a richer soil, and is often found in moist shady woods and on the margins of swamps.

PALM OIL, a fatty oil of the consistence of butter, of a rich orange color, sweetish taste, and odor like that of violets or orris root. It is the product of the fibrous fleshy coat of the drupe or stone fruit of the palm known as the *elæis Guineensis* of W. Africa, belonging to the tribe of cocoanut palms. The same oil is also obtained in Brazil, Cayenne, and the West Indies, and is probably yielded by other species of palm besides that named. To obtain it, the negroes bruise the fruit and cover it with boiling water, upon which the oil rises and is skimmed from the surface. It retains the coloring matter of the fruit, which is removed in the subsequent treatment of the oil in the English factories, either by bleaching in shallow vats on the surface of hot water or by various chemical methods of treatment. Each drupe affording only about $\frac{1}{16}$ of an ounce of oil, and each tree only 3 or 4 lbs. of it, an immense amount of labor must be expended in securing this product, and the forests of palm must be of great extent. The nuts were formerly rejected, but a clear limpid oil is now obtained from them, called palm-nut oil.—Palm oil is very extensively used in the manufacture of candles and soap, and in the various kinds of axle grease. It melts to a very thin fluid at temperatures varying from 75° to 95° F.; the older it is, the greater is the heat required to melt it. By age and exposure it becomes rancid and whitish. In ether it is perfectly soluble, slightly so in cold alcohol, and in boiling alcohol dissolves readily, but separates on cooling. It consists of margarine, oleine, and a solid fat resembling stearine and called palmitine, which constitutes about two thirds of its weight. This substance is further reduced to palmitic acid and oxide of glycerine. The change takes place in saponification; and as these ingredients also exist uncombined in the commercial oil, this is in better condition than any other oil for the process of soap making. In the manufacture of candles, the oil, having been melted by steam pipes introduced into the casks, and freed from impurities, is mixed with one seventh to one sixth of its weight of sulphuric acid, and is briskly agitated for about two hours in copper boilers heated by steam

Oil Palm (Elæis Guineensis)

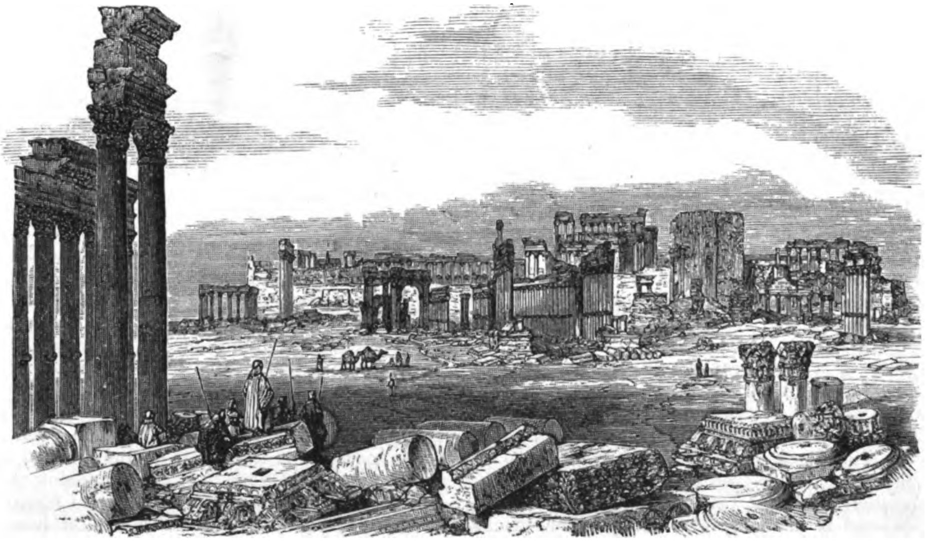
to about 350°. The glycerine and sulphuric acid by their mutual reaction are thus decomposed and escape partially in carbonic and sulphurous acids, and the remainder by subsequent washing. The impure acids are next distilled in copper stills heated by steam injected at a temperature of 600°. The dark residue in the retorts is made by pressure to yield further portions of oil at the close of the distillation, and the black solid mass which remains is used for fuel. The distilled fat, when cooled to 50° or 54°, is broken into cakes 18 in. square and about 1¾ thick, which are distributed upon squares of coir or cocoanut matting, and these being piled upon each other are submitted to the action of a hydraulic press at a temperature of 75°. The fat thus obtained may be run at once into candles for the European markets; but for tropical climates it is again submitted to pressure at a temperature of 120°. The soaps made with palm oil retain the natural agreeable odor of the oil.—In Africa palm oil is eaten to some extent by the natives as a sort of butter. In medicine it is recognized as an emollient, and employed sometimes in friction or embrocation, though possessing no specific virtue over other oleaginous substances.



Oil Palm.—Part of Female Flower Spike, Fruit, and Nut with and without envelope.

PALM SUNDAY. See Holy Week.

PALMYRA, an ancient city in an oasis in the Syrian desert, about 120 m. N. E. of Damascus. It is supposed to be the Tadmor founded or (according to Josephus) enlarged by Solomon, and its Hebrew name, like its Greek and Latin one, signifies "the city of palms." It was autonomous and early became an important emporium, but is seldom mentioned by the more ancient historians. Pliny refers to it as a city of merchants, carrying on the traffic between the Romans and Parthians. In the reign of Hadrian it formed an alliance with Rome. Its ruler Odenathus received the title of Augustus from the emperor Gallienus for his services against the Persians in A. D. 260. He was assassinated in 266, and was succeeded by his widow Zenobia, under whom it reached its greatest prosperity. She extended her sway over considerable portions of Mesopotamia and Syria, and assumed the title of queen of the East. As she refused to acknowledge the su-



Ruins of Palmyra.

premacy of Rome, Aurelian defeated her at Antioch and Emesa, and besieged her capital in 273. Zenobia fled, but was captured, and Palmyra surrendered. Subsequently the people revolted and slew the garrison of 600 men, and Aurelian destroyed the city. Justinian restored it in 527; it was captured by the Saracens in 633, pillaged by them in 744, and taken by Tamerlane in 1400. The place now has a small population of Syrians and a Turkish garrison. The ruins are remarkable, and comprise countless Corinthian columns of white marble extending a mile and a half, numerous tomb towers with separate compartments for the dead, and the remains of a grand temple of the sun, the surrounding columns of which are Ionic. The tombs appear to be of a date preceding the Roman conquest, most of them containing inscriptions in the Palmyrene character and language, a branch of the Syriac. The ruins were visited by some English merchants in 1691, and an account was published in the "Transactions" of the royal society. They were explored in 1751 by Wood and Dawkins, who published an elaborate account with plates (fol., London, 1753); by Irby and Mangles in 1817–'18; and since then have been visited by many travellers, including Burton (1870) and Myers (1871–'2). Much information in respect to recently discovered remains is given in Vogüé's *Syrie centrale* (Paris, 1869).

PALO ALTO, a N. W. county of Iowa, drained by the Des Moines river and its tributaries; area, 576 sq. m.; pop. in 1870, 1,336. The surface is generally level and the soil fertile. The chief productions in 1870 were 19,475 bushels of wheat, 22,336 of Indian corn, 19,976 of oats, 45,525 lbs. of butter, and 7,432 tons of hay. There were 349 horses, 760 milch cows, 1,642 other cattle, and 357 swine. Capital, Emmetsburg.

PALO ALTO (Sp., "tall timber"), a wood in S. Texas, about 8 m. N. N. E. of Matamoros, near which a battle was fought, May 8, 1846, between the Americans commanded by Gen. Taylor, and the Mexicans by Gen. Arista. Taylor had marched on May 1 from Fort Brown, opposite Matamoros, for the relief of Point Isabel, where he had a depot of provisions which was threatened by the Mexicans. Having made this place defensible, he started to return on the 7th. At noon on the 8th the enemy appeared in his front in a position to cut him off from Fort Brown. The action began with an artillery fire from the Mexicans and a cavalry attack with the lance. They were forced back, and the Americans advanced. After an engagement of five hours the Mexicans retreated. They numbered about 6,000, and their loss in killed was about 100. The Americans numbered about 2,300, and their loss was 4 killed and 40 wounded.

PALOMINO DE CASTRO Y VELASCO, Acislo Antonio, a Spanish painter, born in Bujalance in 1653, died in Madrid, April 13, 1726. He studied theology, philosophy, and jurisprudence at Cordova, but devoted himself secretly to painting. In 1678 he went to Madrid, and in 1688 was appointed painter to the king. Among his chief productions are the fresco in the church of San Juan del Mercado in Valencia, that of the "Triumph of Religion" in the convent of San Estéban in Salamanca, and others in Granada, and a series of altarpieces at Cordova. After the death of his wife in 1725 he took orders. He published *El museo pictórico y escala óptica* (Madrid, 1715–'24), and *Vidas de los pintores y estatuarios eminentes españoles* (8 vols., London, 1739–'42), translated into German, French, and English.

PALO PINTO, a N. W. county of Texas, intersected by the Brazos river; area, 974 sq. m. The population was not returned in the census of 1870. The surface is broken and hilly, with much prairie land and some woodland. Sheep and stock raising are the chief industries. The county has suffered from Indian incursions. Capital, Palo Pinto.

PÁLOS, a town of Andalusia, Spain, in the province and 5 m. S. E. of the town of Huelva, on the Tinto, near its mouth in the gulf of Cadiz; pop. about 1,200. It is remarkable as the port from which Columbus sailed (Aug. 3, 1492) on his first voyage to America. Between it and the sea is the old convent of La Rabida, noted in the earlier history of the navigator.

PALPITATION. See Heart, Diseases of the.

PALSY. See Paralysis.

PAMIERS, a town of France, in the department of Ariége, on the river Ariége, 10 m. N. of Foix; pop. in 1872, 8,690. It is the seat of a bishop, has two religious communities of men and four of women, and a communal college. It was formerly the capital of Foix.

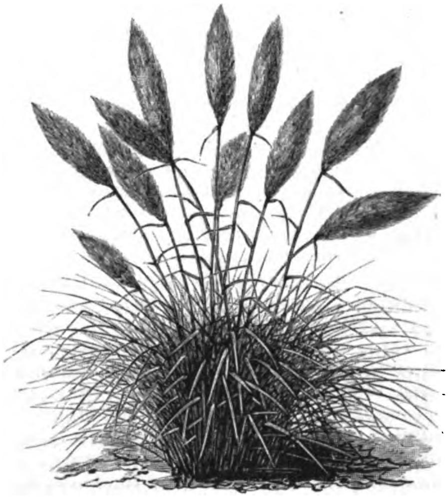
PAMLICO, an E. county of North Carolina, bordering on the Neuse river and Pamlico sound, formed from portions of Beaufort and Craven cos. in 1872; area, about 300 sq. m. The surface is low and swampy. Capital, Vandemere.

PAMLICO RIVER, an estuary receiving the waters of Tar river and Tranter's creek, and opening into Pamlico sound, N. C. It is from 1 to 8 m. broad and 40 m. long, and navigable for all vessels which can enter the sound.

PAMLICO SOUND, a shallow body of water on the coast of North Carolina, separated from the Atlantic by long and narrow sandy islands, whose outermost point is Cape Hatteras; breadth from 10 to 30 m., length about 80 m. The principal entrance is by Ocracoke inlet on the southwest. It communicates with Albemarle and Currituck sounds on the north, and receives Pamlico and Neuse rivers on the west.

PAMPAS, the great plains of South America, stretching from lat. 50° S. in Patagonia northward through the Argentine Republic to the Bolivian frontier, about 27 degrees of latitude, and covering an area of about 600,000 sq. m. The northern portion is occupied by the vast unexplored territory of the Gran Chaco; the southern forms an immense desert interspersed with sand pools; the eastern, extensive plains and marshes, with tracts entirely inundated; while the western border rises gradually into the elevated region of Salta, Tucuman, Santiago, Cordova, and San Luis, in the Argentine Republic, and into the Andes proper in Patagonia. The natural features of the northern and northwestern parts are plains of magnificent pasture, dense timber forests, and numerous lagoons and rivers, chief among the last being the Pilcomayo and the Bermejo. The central portion is distinguishable into several subdivisions, differing in climate and products, although under the same parallel. Proceeding westward from Buenos Ayres, the first of these presents for nearly 200 m. an alternate growth of clover and thistles; the next, a covering of long grass and brilliant flowers extending without a weed some 400 m. further westward; the third, reaching to the base of the Andes, one continuous grove of shrubs and small evergreen trees, so evenly set that a horseman may gallop at random between them without inconvenience. Change of season brings little variation in the aspect of the two regions last referred to; but in the first remarkable mutations occur. During the winter months the thistles and clover are exceedingly rich and strong, and support countless herds of wild cattle. On the approach of spring the clover disappears, and nothing is distinguishable save an immense forest of giant thistles, so closely set and so strong as to form an impenetrable barrier. In summer the thistles give place to a new and luxurious growth of clover. Numerous rivers traverse the central and southern parts, but the only absolutely perennial stream is the Rio Negro, which forms the boundary line with Patagonia. The Andine regions abound in guanacos, llamas, and vicuñas; deer, wild hogs, and armadillos are everywhere found; ostriches are plenty; and the rodent tocutuco and vizcacha render travel dangerous from their burrowings.

PAMPAS GRASS (*gynerium argenteum*), a large perennial grass from the plains of South America. It is diœcious, and the generic name (Gr. γυνή, female, and ἔριον, wool, hair) is derived from the fact that the glumes of the female flowers are furnished with long hairs, which are lacking in the male flowers. An old and well established specimen of this grass presents an enormous tuft 4 to 6 ft. high and as much or more across, of very long narrow leaves, with rough edges, which curve gracefully and make the plant highly ornamental for its foliage alone. It flowers at the end of summer or in early autumn, throwing up numerous stalks, sometimes in an old plant as many as 40 or 50, which are from 4 to 15 ft. high, according to the strength of the plant, each surmounted by a dense panicle of flowers 1 or 2 ft. long, which in the pistillate plant are of a beautiful silky, silvery lustre. The flowers are similar in structure to those of our common reed (*phragmites*), to which it is closely related, with but two florets in each spikelet. This grass was first introduced into cultivation by seeds sent from Buenos Ayres to England in 1843, and is now quite common; it is easily raised from seed; but as female plants are much more ornamental than the males, and as there is no way of telling the sex of the plants until they bloom, it is customary to multiply it by division of old plants, the sex of which is known. It is barely hardy in the climate of New York. Further south no protection is needed. Varieties have been obtained in which the plumes are tinged with purple, others with yellow, and there is one form in which the leaves are variegated with white.



Pampas Grass (Gynerium argenteum).

PAMPELUNA. See PAMPLONA.

PAMPHILUS, a Greek painter, born in Amphipolis, flourished between 390 and 350 B. C. Not more than four or five of his pictures are specified by ancient authors, but Quintilian says he was one of the most celebrated among the Greeks for composition. He was the master of Apelles and Melanthius.

PAMPHILUS, an early Christian writer, born probably in Berytus, suffered martyrdom in Cæsarea, Feb. 16, 309. He studied in Berytus, and under Pierius in Alexandria, and became a presbyter of Cæsarea in Palestine. About the close of 307 he was imprisoned, and finally put to death, for refusing to sacrifice to the gods. With his most intimate friend Eusebius, who attended him in his imprisonment and assumed his name, he probably wrote five books of "The Apology for Origen." At Cæsarea he formed a public library, chiefly of ecclesiastical works, which became very celebrated, and founded a theological school. In conjunction with Eusebius he prepared an edition of the Septuagint, which was commonly used in the eastern church. The *Expositio Capitum Actuum Apostolicorum* has been ascribed to him, but doubtfully. The life of Pamphilus was written by Eusebius, but only a few doubtful fragments remain.

PAMPHYLIA (Gr. πᾶν, all, and φῦλον, tribe), an ancient division of Asia Minor, on its S. coast, now comprised in the Turkish vilayet of Konieh. It is said to have been first called Mopsopia, from Mopsus, its first Greek colonizer. The later name referred to the mixed character of its inhabitants, among whom were many aboriginal tribes from the interior. Pamphylia was bounded E. by Cilicia, N. by Pisidia, from which it was divided by Mt. Taurus, and W. by Lycia. It was a narrow strip about 90 m. long, and formed an arch around the Pamphylian gulf (now gulf of Adalia). The eastern extremity is flat and sandy, the western hilly with the ramifications of Mt. Taurus that run down to the coast. The western part of this district is a mass of incrusted vegetable matter, beneath which its rivers, the ancient Catarrhactes, Cestrus, Eurymedon, and Melas, find their way to the sea.—Pamphylia was conquered by Cyrus, and when the Persian empire was destroyed by Alexander it became subject to Macedon, and then to Syria. It subsequently became a part of the kingdom of Pergamus, and finally a Roman province. The principal towns were Attalia (now Adalia), Olbia, Corycus, Aspendus, Perge, Syllium, Side, Cibyra, and Ptolemais. The language spoken was a mixture of Greek and a native (probably Semitic) dialect.

PAMPLONA, or **Pampeluna** (anc. *Pompelon*), a fortified city of Spain, capital of the province of Navarre, on the left bank of the Arga, 197 m. N. E. of Madrid; pop. about 23,000. It stands in a plain flanked on three sides by the Pyrenees, is entered by six gates, and has 29 streets. The cathedral was founded in 1100, and rebuilt three centuries later by Charles III. of Navarre. The university was founded in 1608. The best public library is that attached to the cathedral. Water is conveyed from the mountains of Subiza, 12 m. distant, by a superb aqueduct, one portion of which rests on 97 arches, each of 35 ft. span and 65 ft. high. The citadel, separated from the town by a vast esplanade, occupies a commanding site. Cloth, leather, wax, and earthenware are manufactured, and there is much trade in flour and wool.—Pamplona was anciently the chief town of the Vascones in Hispania Tarraconensis. The Goths under Euric wrested it from the Romans in 466, and the Franks captured it in 542. Charlemagne seized it in 778; and after falling into the hands of the Saracens under Al-Hakim, it was recaptured by the Franks in 806, and became the capital of Navarre about the middle of the century. It has since been many times besieged and captured. The Carlists blockaded it Sept. 1, 1874, half the population was driven away, and the city now (1875) presents a most desolate appearance.

PAN, in Grecian mythology, the god of flocks and shepherds. He was the son of Mercury by Callisto, Dryops, Œneis, or Penelope, or according to some authorities of Penelope by Ulysses or by all her suitors in common. He is represented with horns, a pug nose, and a goat's beard, feet, and tail, and was perfectly developed from his birth. When his mother first saw him she ran away in fright, but Mercury carried him to Olympus, and the nymphs nursed him. He was a favorite with all the gods, and was especially the companion of Bacchus. He had a terrific voice, by which he frightened the Titans in their struggle with the gods. Phidippides asserted in Athens that Pan promised him to frighten away the Persians if the Athenians would worship him; and hence originated the expression "panic fear." He played upon the syrinx or shepherd's flute, of which he was the inventor, and was the patron of hunters, but was dreaded by travellers. He was the god of bee-keepers and fishermen, and according to Servius was considered as the god of nature generally, or a personification of the universe (Gr. τὸ πᾶν), whence his name, though Pan is also associated with the Greek πάειν, Latin *pascere*, to feed or pasture. He loved the nymph Echo, by whom or by Pitho he became the father of Iynx, the nymph Pitys, who was metamorphosed into a fir tree, and Syrinx, after whom he named his flute. His worship, native in Arcadia, extended thence over other parts of Greece, and after the battle of Marathon was introduced into Athens. In Rome he was honored under the names of Inuus and Faunus. The fir tree was sacred to him, and sacrifices were offered to him consisting of cows, rams, lambs, milk, and honey. The satyrs were his attendants.

PANÆNUS, a Greek painter, who flourished in Athens about 448 B. C. He was a nephew of Phidias, and when that sculptor made the statue of the Olympian Jupiter, Panænus ornamented the base with a series of mythological pictures. He also painted the roof of Minerva's temple at Elis. His principal work was the battle of Marathon in the Pœcile at Athens, representing four periods of the combat.

PANAMA (Sp. *Panamá*). **I.** A state of the United States of Colombia, occupying the isthmus connecting North and South America, between lat. 6° 45′ and 9° 40′ N., and lon. 77° and 83° W.; area, 31,921 sq. m.; pop. in 1870, 220,542. Its general form is an arc curving from E. to W. with its convex side toward the north. On the southeast it joins the state of Cauca; on the west it is bounded by Costa Rica. In its widest part the distance from sea to sea, through the peninsula of Azuero, is about 120 m.; in the narrowest, between the gulf of San Blas and the mouth of Bayano river, about 30 m.; following the line of the Panama railway, 47½ m. The coast line on the Caribbean sea is about 450 m. long, and forms a reverse curve, convex from the gulf of Darien to Point Manzanillo, and concave from thence to the Doraces river. The principal bays are Caledonia bay and the gulf of

San Blas, in the latter of which are the islands forming the Mulatas archipelago, Limon or Navy bay, and the Chiriqui lagoon. The chief ports are Puerto Escoces in Caledonia bay, San Blas, Portobello, Colon or Aspinwall in Limon bay, and Chiriqui. On the Pacific coast the bay of Panama makes an indentation about 110 m. deep and 122 m. wide at its mouth. Its W. coast is formed by the peninsula of Azuero, which extends S. E. from the mainland about 75 m. There are many islands in the bay, the principal of which are the Pearl islands. At its N. extremity are the city and port of Panama, and on its E. coast is the gulf of San Miguel, which contains a good port. There are also several smaller ports on the W. coast. Beyond the peninsula of Azuero the coast of the isthmus is broken by the bay of Montijo, which contains several islands. The largest of these, Coiba, has an area of 180 sq. m., and contains the port of Damas. From the Atlantic coast the isthmus appears to be traversed through its entire length by a range of high mountains, the continuation of the Andes, but surveys have proved that in some parts the elevation does not exceed 300 ft. above the level of the sea. From this dividing ridge about 150 streams flow into the Atlantic, and more than twice as many into the Pacific. The largest of these is the river Tuira, which rises in the sierra on the borders of Cauca, and empties into the gulf of San Miguel; it is 162 m. long, and is navigable for barges for 102 m. The Chagres, which falls into the Caribbean sea a little W. of Limon bay, is navigable by bongos for about 30 m. The Chepo, after a W. N. W. course of about 75 m., turns S. and empties into the bay of Panama. Among the minerals of Panama are gold, mercury, copper, iron, salt, gypsum, lime, and coal. The product of the gold mines—once considerable, as is attested by the ancient name of the isthmus, Castilla de Oro, and by the large quantities of the metal formerly extracted from the *huacas* of Chiriqui—is now insignificant, being probably less than $100,000 annually. Coal is mined in Bocas del Toro and other places. There are several thermal springs, and salt is an important product. The climate is very hot on the coasts; on the flanks of the mountains in the interior it is relatively cool, but miasmatic fevers prevail everywhere. The seasons are the wet and the dry, the former lasting from May to December inclusive; July, August, and September are the hottest months. Nearly all the vegetable products of the torrid zone grow luxuriantly, and much of the surface is covered with dense forests, in which are found many of the most valuable kinds of timber, dye, cabinet, and medicinal woods, and shrubs. Codazzi enumerates 55 varieties of fruit trees. Conspicuous among the trees are the giant cedars and the palms, among the latter of which are the wine, sago, ivory, glove, cabbage, and cocoa palms. In the rainy season, when the blossoming trees are festooned with flowering vines and epiphytes, the forests are magnificent almost beyond description. The fauna corresponds with that of the lower Magdalena valley, excepting the monkeys and parrots, which are not equalled in variety and number elsewhere N. of the forests of the Amazon. Taboga island in the bay of Panama is noted for the number and great size of the turtles found there. The Pearl islands were once celebrated for their pearl fisheries, but the oysters are now nearly exhausted, and in 1874 the fishing was prohibited by law for a term of years. Agriculture is very backward, and not more than one tenth of the surface is cultivated. Maize and rice are the principal grains; coffee, cacao, tobacco, and sugar cane are raised for home consumption; cotton is indigenous and perennial, and the indigo plant grows spontaneously. Manufacturing industry is limited to the production of cloth and grass hammocks, coarse linen, grass hats and knapsacks, pack saddles, matting, tiles, small boats, sails, soap, and a few other articles. Among the products exported are cocoanuts, cocoanut oil, bananas, caoutchouc, and tortoise shells. The foreign trade is carried on principally through the ports of Panama and Aspinwall, the termini of the Panama railway. As no official accounts are kept, the commerce proper of the isthmus cannot be distinguished from the transit trade. The latter amounts to the estimated annual value of $50,000,000, about two thirds of which represents that from the Pacific to the Atlantic. The only railway is that from Panama to Aspinwall, 47½ m. long, which is owned and controlled by an American company. It was begun in 1850, and on Jan. 28, 1855, the first train passed over it. Its cost was $7,500,000. The finest work on the road is the iron bridge over the Chagres, which is 625 ft. long and 40 ft. above the water, and cost $500,000. The only advantages reserved from the railway company by the government are 3 per cent. of its net revenues, and $10,000 annually as a compensation for the free transit of all foreign mails. In connection with the railway are lines of steamers between Aspinwall and New York, and Panama and San Francisco; and other lines, British, French, and Chilian, touch at one or the other of these ports. All the ports are now free. A submarine cable connecting Aspinwall and Kingston, Jamaica, was broken in 1872, and has not yet (1875) been repaired. A cable from Valparaiso to Panama, touching at the principal intermediate ports, is projected. Public education is beginning to receive attention. At the commencement of 1874 there were no public schools, but before its close there were 16, well attended. The isthmus was formerly divided into the provinces of Azuero, Chiriqui, Panama, and Veragua, but in 1865 the several provinces were formed into the state of Panama, of which each now constitutes a department.

Besides the capital, Panama, the other chief towns are Santiago, Montijo, David, Portobello, Colon or Aspinwall, Chagres, and Santos.—Columbus, in his last voyage in 1502, discovered Chiriqui lagoon, and established a colony at Belen, but it was soon abandoned. The first permanent settlement was that of Portobello by Nicuesa, in 1510. The Pacific was first reached by Balboa, Sept. 26, 1513. In 1514 reports of the immense riches of Castilla de Oro, as the country was then called, led to the expedition of Pedrarias Davila, who transferred the seat of government in 1518 to Panama. In 1586 Drake sacked Portobello; the buccaneers under Morgan took it in 1665, and in 1670 reduced the castle of San Lorenzo at Chagres and burned Panama. In 1680 they crossed the isthmus under Sharp, Ringrose, and Dampier, and took the city of Santa Maria, which led to the closing of the gold mines of Cana in 1685 by royal decree In 1698 William Paterson founded a Scotch colony at Puerto Escoces, on Caledonia bay. (See DARIEN, COLONY OF.) In 1719 the Catholic missionaries had established several towns on the Atlantic coast and on the rivers flowing into the gulf of San Miguel, but they were all destroyed by the Indians. In 1790 a treaty of peace was made with the Indians of Darien, in compliance with which the Spaniards abandoned all their forts in that district. —The isthmus of Panama has derived its chief importance from its supposed facilities for the construction of an interoceanic canal. Since 1528 the idea has been mooted of opening a canal between the river Chagres (falling into the Caribbean sea at the town of that name) and the Grande, falling into the Pacific near Panama, or the Trinidad and Caimito. The route was examined by two Flemish engineers under the orders of Philip II.; but for political reasons the king ordered that no one should revive the subject under penalty of death. In 1826 Domingo Lopez, a native of Colombia, traced a new line for a canal between Panama and Portobello. But the first formal exploration was made in 1827, under the orders of Gen. Bolivar, by the engineers Lloyd and Falmark. Their labors, concluded in 1829, proved that a railway, if not a canal, could readily be built between Chagres and Panama. In 1843 the French government sent out Messrs. Garella and Courtines to make examinations. Garella reported in favor of a canal from Limon bay, to pass under the dividing ridge of Ahogayegua by a tunnel 120 ft. high and 17,390 ft. long, to the bay of Vaca del Monte, 12 m. W. of Panama. In 1852 the government of New Granada conceded to Dr. Cullen and others the privilege of building a canal between Caledonia bay and the gulf of San Miguel. In 1864 Mr. Kelley of New York surveyed a route from the gulf of San Blas to the river Chepo, which would require a long tunnel. In 1865 M. de la Charme surveyed a line from the S. part of the gulf of Darien to the gulf of San Miguel, *via* the river Tuira. In the same year M. de Puydt, an engineer employed by the French international Colombian company, announced the discovery of a favorable passage from the port of Escondido to the Tuira, and thence into the gulf of San Miguel. In 1870 Capt. Selfridge, U. S. N., surveyed two lines from Caledonia bay by different routes to the mouths of the rivers Sabana and Lara on the Pacific, but found no lower level on the Cordillera than 1,000 ft. Another line run from the bay of San Blas to the Chepo river was still more unfavorable. In 1871 he examined the line of M. de Puydt and found it impracticable. In 1874 two other expeditions were sent out by the United States government, one to survey a line between the Atrato and the Pacific, across the Colombian state of Cauca, and the other a line parallel with the

Cathedral of Panama.

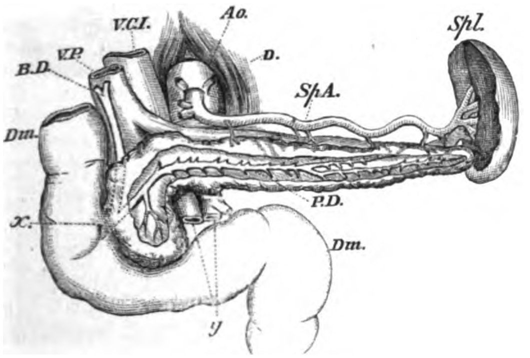
Panama railway. Their reports are about to be published. **II.** A city, capital of the state, situated on the bay of the same name, in lat. 8° 56′ N., lon. 79° 31′ 2″ W.; pop. about 11,000. It occupies a rocky peninsula extending from the base of the volcanic hill of Ancon about one fourth of a mile into the bay. The houses are mostly of stone, built in the Spanish style, the larger ones with courtyards and balconies, and the smaller with but one story. The only buildings of note are the cathedral, the churches, the *cabildo* or town hall, and the warehouses of the Panama railway. The bay is shallow, so that only small vessels can approach the shore, and the roadstead, though protected by several small outlying islands, is dangerous on account of the frequency of northers; but ships find excellent anchorage at the neighboring island of Taboga, where they take in water. About 2½ m. from the town are the islands of Perico and Flamenco, the stations of the California and Central American company's steamers. On the latter island are docks and other facilities for repairing vessels. Passengers and freight are carried from the steamers on steam tugs and landed on a pier which extends 450 ft. into the bay. The average rise and fall of the tide is 12 ft. Panama has a large commerce, but most of it is due to the transit trade. The arrivals of steamers average 13 a month, and of sailing vessels not more than 100 a year. The steamers comprise two American lines connecting with San Francisco and the Mexican and Central American ports, and British, French, and Chilian lines running to Guayaquil, Callao, Valparaiso, and intermediate ports. The coasting trade is carried on in schooners and bongos, their freight consisting principally of caoutchouc and provisions. —Panama was founded in 1518 by Pedrarias Davila, about 6 m. N. E. of the present site, to which it was transferred after the destruction of the old city by the buccaneers in 1670. It has suffered much from disastrous fires: in 1737, when it was almost entirely destroyed, and in 1864, 1870, and 1874, the loss in the last year amounting to $1,000,000.

PANATHENÆA, the most splendid of the Athenian festivals, celebrated in honor of Athena (Minerva) Polias, protectress of the city. According to tradition, it was instituted by Erichthonius under the title of Athenæa. It retained this name, and the celebration was confined to Athens, until the reign of Theseus, who united all the Attic tribes, and this, becoming their common festival, was called Panathenæa. The festival was divided into the lesser and the greater, the former taking place every year, the latter in the third year of each Olympiad. The difference between the two consisted in the greater splendor and solemnity of the latter. The exercises consisted of foot, horse, and chariot races, gymnastics, and musical and poetic contests. The sacrifices were very costly, for every town in Attica and every colony of Athens was obliged to send a bull for the celebration. The duration of the festival was gradually extended from two to twelve days. The great attraction of the Panathenæa was the procession, in which nearly all the inhabitants of Attica took part, to carry to the temple of Athena Polias the peplus of the goddess, a crocus-colored garment in which were woven representations of her victorious acts. Phidias and his disciples represented this procession in the frieze of the Parthenon.

PANAY. See PHILIPPINE ISLANDS.

PANCKOUCKE. I. Charles Joseph, a French editor, born in Lille, Nov. 26, 1736, died in Paris, Dec. 19, 1798. His father, ANDRÉ JOSEPH PANCKOUCKE (1700–'53), a publisher, was a prominent Jansenist and compiler of numerous works. The son became one of the most eminent booksellers of Paris, and edited Buffon's works and other celebrated publications, including *Le grand vocabulaire français*, *Le répertoire de jurisprudence*, and *Le voyageur français*, comprising an aggregate of about 100 volumes. Voltaire and his literary executors designated him as the editor of his works; but Panckoucke ceded the editorship to Beaumarchais, though he supervised the publication. He translated Tasso's *Gerusalemme liberata*, Ariosto's *Orlando*, and Lucretius. His greatest enterprise was the *Encyclopédie méthodique*, published conjointly with Agasse (201 vols., 1781–1832, comprising 47 vols. of plates). He was proprietor of the *Mercure français*, which he edited in conjunction with his brother-in-law Suard; and in November, 1789, he founded the *Moniteur*, with La Harpe, Andrieux, Regnier, and other eminent men as collaborators. **II. Charles Louis Fleury,** a French editor, son of the preceding, born in Paris, Dec. 23, 1780, died July 12, 1844. He studied jurisprudence, and early held an office, but afterward engaged in the publishing business. He published the *Dictionnaire des sciences médicales* (60 vols., 1812 *et seq.*), followed by *Biographie médicale* and *Flore médicale* (the latter illustrated by his wife, who died in 1860); *L'Expédition des Français en Égypte* (26 vols., 1820–'30, besides 12 vols. of plates); *Les barreaux français et anglais* (19 vols., 1821); and 18 editions of the complete and separate works of Tacitus, including a superb one of the Latin text (80 copies, 1826–'7). His most celebrated publication was the *Bibliothèque latine-française*, with translations (174 vols., 1828 *et seq.*), for which he translated the works of Tacitus (7 vols., 1830–'38).—The publishing house has been continued by his son ERNEST (born in 1806), who was for some time managing director of the *Moniteur*, and who has made a metrical translation of Horace (1834; new ed., 1855), and edited many important works.

PANCREAS, a single, non-symmetrical glandular organ, situated in man transversely across the upper part of the abdomen, about on the level of the last dorsal vertebra; it is behind the peritoneum, at the posterior part of the epigastric region, on the spine and great vessels, between the three portions of the duodenum, behind the stomach, and on the right of the spleen. It is of an irregular, elongated form, flattened from before backward, the left extremity very thin and prolonged to and sometimes beneath the spleen; the right extremity rounded, resting against the second portion of the duodenum; the color is grayish white; the length is about 7 in., width 1½, and thickness 1 in., and the weight 3 to 4 oz.; it is rather smaller in woman. The duct is in the interior, going from left to right, receiving in its course the excretory canal which comes from the larger end, or little pancreas as it is sometimes called; it opens into the duodenum, at the lower part of the second curve, by a special orifice, or one common to it and the bile duct; its arteries come principally from the splenic branch of the cœliac axis, and its nerves from the solar plexus. It closely resembles in structure the salivary glands, like the parotid; it is made up of clusters of secreting follicles forming the ends of the finely branching divisions of the duct; each cluster, with its vessels, nerves, and connecting areolar tissue, forms a lobule, and the several lobules are held together by the ducts, vessels, and areolar tissue; its development begins by a budding forth of cells from the intestinal canal. The secretion of the pancreas, called the pancreatic juice, is a colorless, alkaline fluid, possessing a considerable degree of viscidity; it consists of nearly 10 per cent. of solid matters, of which by far the most abundant and important is an organic substance, termed pancreatine, resembling albumen in being coagulable by heat, by nitric acid, and by alcohol, but differing from it in being also coagulable by sulphate of magnesia in excess. The pancreatic juice has been obtained in the lower animals by introducing a silver canula into the pancreatic duct, and collecting the fluid discharged from its orifice during digestion. Its most remarkable property is that, when brought in contact with oleaginous matters, it at once reduces them to a state of emulsion, the fatty substance being broken up into finely divided particles, and held suspended in this condition in the animal fluid; this intimate mixture of the oily and albuminoid matters forms a white, opaque, milky liquid, and is known as the chyle; it is also true that the chyle makes its appearance in the intestines only after the pancreatic juice has had access to the alimentary matters. From these experiments there is little doubt that the main office of the pancreatic juice in digestion is to act upon the oleaginous ingredients of the food, and to prepare them for absorption by the emulsifying process. (See CHYLE, and DIGESTION.) The daily quantity of pancreatic juice secreted and discharged into the intestine is estimated at rather more than half a pound in the dog, and between a pound and a half and two pounds in the human subject; the secretion is most abundant at the commencement of and during the digestive process, and the probability is that it is very much diminished, if it does not cease entirely, in the intervals of digestion. The pancreas is liable to hypertrophy, atrophy, softening, induration, inflammation extending from neighboring organs, simple and malignant tumors, fatty degeneration, and calculous growth. That it performs some essential function is evident from its existence in all vertebrates, whether carnivorous or herbivorous, and from its presenting a constant relation to the duodenum, whatever be the proportions of the alimentary canal or the form of the organ; it is even found in a rudimentary condition in the invertebrates, and as low as the worms (*rotatoria*); also in the annelids proper, the gasteropod and cephalopod mollusks, and in many insects; it exists here as cæcal appendages with thick walls, lined with ciliated epithelium, and opening into the beginning of the intestine. The pyloric cæcal appendages of most osseous fishes have generally been regarded by anatomists as the analogue of a pancreas; they become more and more numerous and complex, from the simple ones in the turbot to the 60 in the salmon with a secreting surface of more than 32 ft.; in the sturgeon they become united into a glandular organ. In some orders these cæca are absent, as in the sharks and rays, pike, and eel, in which the pancreas has the ordinary glandular form. Some authors deny the pancreatic nature of these cæca, and maintain that they secrete a fluid only accessory to the true pancreatic secretions. In reptiles the pancreas is always present, often large, and in the higher orders more or less in contact with the spleen. In birds it is larger than in any other class, and it probably performs also the office of salivary glands, which are here wanting; it communicates with the intestinal canal by two or three openings; as a general rule the pancreatic se-



The Spleen (*Spl.*) with the splenic artery (*Sp. A.*). Below this is seen the splenic vein running to help to form the *vena portæ* (*V. P.*). *Ao.*, the aorta; *D.*, a pillar of the diaphragm; *P. D.*, the pancreatic duct exposed by dissection in the substance of the pancreas; *Dm.*, the duodenum; *B. D.*, the biliary duct opening with the pancreatic duct at *x*; *y*, the intestinal vessels.

cretion is poured in before the bile, though the ducts are so near together that no physiological conclusions can be drawn as to their separate actions; the greatest separation is probably in the ostrich, in which the bile duct opens close to the pylorus and the pancreatic duct 3 ft. lower down; it is generally whitish red, large, elongated, and usually with two lobes. In mammals it differs from that of man chiefly in color and in its more or less division into lobes; in rodents, and especially in the rat, it is spread out in an arborescent manner; in the rabbit the duct enters the intestine from 9 to 13 in. from the pylorus, affording special facilities for studying its secretion, since in this animal it has been found that the chyle does not make its appearance in the intestine or the lacteals until the food has passed the orifice of the pancreatic duct; in other species, where this duct opens into the intestine higher up, the chyle is also found at a higher level. The pancreas is often called sweetbread in the calf, but this term more properly belongs to the thymus gland.

PANCREATINE, a name given to various preparations representing the activity of the pancreatic juice, and containing its peculiar ferment in greater or less purity. The processes by which pancreatine is formed are not officinal, and some of them are secret. A glycerine extract may be made, and it is said that pancreatine may be prepared by a process similar to that employed for pepsin. (See PEPSIN.) The pancreas itself chopped up with meat makes a good digestive for certain purposes. Pancreatine digests albuminoid materials, and assists in transforming starch into sugar. Its peculiar function however is the digestion of fat, which it forms into a fine and permanent emulsion capable of being absorbed. It possesses the special advantage over pepsin, that it does not require an acid medium for its action, but digests in an alkaline, neutral, or even acid fluid, although the pancreatic juice itself is alkaline. Pancreatine has been somewhat used in medical practice, especially with fatty articles of food or medicine. It may be given with cod-liver oil, and may be used in the wasting diseases of children. The fresh pancreas chopped fine with meat has been recommended as a highly digestible and consequently absorbable material for injection into the rectum when it is necessary to sustain life in this way. Pancreatine is sometimes combined with pepsin. Mixed with cream it forms an emulsion, which has been used as a substitute for cod-liver oil.

PANCSOVA, a fortified market town of S. Hungary, in the late Military Frontier, near the mouth of the Temes in the Danube, 67 m. S. S. W. of Temesvár; pop. in 1870, 13,408. It has Roman Catholic and Greek churches, and several schools of a high grade. There are extensive manufactories of beet sugar. It is a station of the Danube steam packet line, and has an active trade. Here, on July 30, 1739, the Austrians under Field Marshal Wallis gained a great victory over the Turks; and on Jan. 2, 1849, the Austrian general Meyerhofer defeated the Hungarians under Gen. Kiss.

PANDA, a carnivorous plantigrade mammal, of the genus *ailurus* (F. Cuv.), which seems to connect the bears with the civets; by some authors it is placed with the civets. The teeth resemble those of the bears; the molars $\frac{5-5}{6-6}$, or perhaps $\frac{6-6}{6-6}$, a single unicuspidate false molar on each side above, the others tuberculate, and two tuberculate on each side below; the canines are nearly straight; the ears rounded and small; claws curved and semi-retractile; tail thick at the base and bushy; feet five-toed, and the soles covered with thick fur. The only species described is the *A. fulgens* (F. Cuv.), inhabiting the snowy regions of Nepaul; it is about the size of a large cat, with full and soft fur; the color above is chestnut brown, brightest on the shoulders, with throat, belly, and legs black; head whitish, with a reddish brown spot under the eyes; tail like a lady's boa, banded with red and yellow; it is rather an elegant animal. It is found in the neighborhood of rivers and mountain streams, living much on trees, and feeding on small birds and mammals; it is called *wah* from its cry.

Panda (Ailurus fulgens).

PANDANUS (Malayan, *pan-dang*), the generic name of the screw pines, so called not because of their resemblance to the pines proper, but from the leaves, which are arranged spirally, somewhat like those of the pineapple. The genus is the principal one of the order *pandanaceæ*, which as at present restricted consists of only three genera of arborescent plants, with simple or branched stems and simple leaves arranged in three very close spirals; the flowers are diœcious, without calyx or corolla, and arranged very compactly upon a spadix; the fruit consists of numerous fibrous drupes closely crowded and cohering. The trunks in this family are supported by strong adventitious roots, and appear as if set upon a cone of props. The screw pines are natives of the East, especially the islands of the Indian archipelago, abounding along the banks of rivers and the littoral marshes, often occupying large tracts to the exclusion of other vegetation. There are 30 or more species, some being 20 or 30 ft. high, but the majority do not exceed 10 or 15 ft. One of the finest is *pandanus cande-*

labrum, the chandelier tree, so named on account of its manner of branching. The most useful species, *P. utilis*, is the *vacoa* of Mauritius, where it grows wild, and is also cultivated to a great extent; its leaves are used in manufacturing the sacks in which sugar is exported, and in England the empty sacks are converted into fish bags. The flowers of *P. odoratissimus* are exceedingly fragrant, and the tree is cultivated in Japan for the sake of their perfume. A number of species and varieties are in cultivation; their handsome and peculiarly arranged leaves make the plants conspicuous ornaments in a stove house; the leaves, from 3 to 6 ft. long, are generally gracefully recurved and pendulous, with their edges and the midrib upon the back armed with very sharp recurved prickles, which, while they render the plants troublesome to handle, add much to their beauty, as they are white, brown, or red, and in fine contrast with the green leaf; in some the leaf is marked with white longitudinal stripes. Small plants of screw pines are used for decorating tables and rooms.

Pandanus candelabrum.

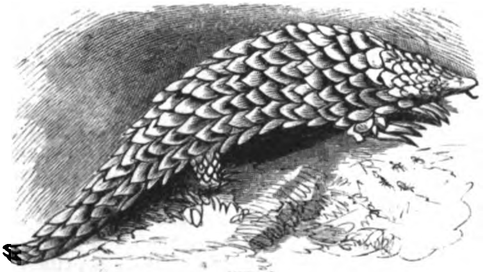
PANDECTS. See Civil Law, vol. iv., p. 623.

PANDORA (Gr. *πᾶν*, all, and *δῶρον*, a gift), in Grecian legends, the first created woman. According to Hesiod, Jupiter, angry because Prometheus had stolen fire from heaven, ordered Vulcan to make a beautiful virgin, who was dressed by Minerva, adorned with fascinations by Venus and the Graces, and endowed with a deceitful mind by Mercury. She was brought to Epimetheus, who, disregarding the command of his brother not to accept from Jupiter any present whatever, received her while Prometheus was absent. When admitted among men, she opened a casket enclosing all the evils of mankind, and everything escaped except delusive hope. Another version of the story makes Pandora open a casket containing the winged blessings of the gods. In the Orphic poems, Pandora is ranked along with Hecate and the Erinnyes as an infernal divinity.

PANEL. See Jury, vol. ix., p. 724.

PANGAUM. See Goa, New.

PANGOLIN, or **Scaly Ant-Eater**, a burrowing edentate mammal of the old world, whose species constitute the genus *manis* (Linn.). These animals have the long pointed snout, toothless mouth, and extensile tongue of the ant-eaters, and the upper parts of the body and the tail armed with scales like the armadillos; the external ears are hardly perceptible; the scales are corneous and imbricated, permitting the body to be rolled up in a ball secure from the teeth of the largest carnivora; the limbs are short and robust, the hind ones the longest; the claws curved and formed for digging; the tail long, thick at the base. The skeleton has no clavicles, the stomach is simple, and the cæcum is absent. They are found in the warm parts of Africa and Asia, living in holes which they dig in the ground or in the hollows of trees, and feeding upon insects, especially ants, which they capture on their long, round, and viscid tongue; the gait on the ground is awkward, as they walk on the outer side of the feet, with the claws turned in; they are harmless, though they display great strength and activity in tearing to pieces the hills of *termites* and ants. The largest species is the short-tailed pangolin (*M. pentadactyla*, Linn.), 3 or 4 ft. long, with five toes, and the thick tail about as long as the head and trunk; it is found in India and Ceylon; the scales are deep brown in the adult animal, and hard enough to turn a musket ball. The long-tailed pangolin (*M. tetradactyla*, Linn.), from the coast of Guinea, is four-toed, with a flatter tail nearly twice as long as the rest of the body; the scales are large, dark-colored, with yellow margin, arranged in 11 rows on the body, and armed with three points at the end; under parts covered with rough brown hairs; the whole length is between 2 and 3 ft. From their external covering and shape they resemble scaly lizards more than mammals; both surfaces of the tail



Short-tailed Pangolin (Manis pentadactyla).

are covered with scales. The flesh of the pangolins, which are probably the best protected of mammals against carnivora, is delicate and much prized by the natives of Africa.

PANINI, a Sanskrit grammarian, probably of the 4th century B. C., according to a passage in Vedic literature which speaks of him as a contemporary of King Nanda. Little is known of his history, for the biography found in the *Kathâsaritsâyana* of the 12th century bears every mark of a fanciful composition. Of his celebrated grammar Max Müller says: "It is the perfection of a merely empirical analysis of language, unsurpassed, nay, even unapproached, by anything in the grammatical literature of other nations." See Max Müller, "History of Ancient Sanskrit Literature" (London, 1859); Goldstücker, "Pânini, his Place in Sanskrit Literature" (London, 1860); and Benfey, *Geschichte der Sprachwissenschaft* (Munich, 1869).

PANIPUT, a town of British India, in the district and 60 m. N. N. W. of Delhi; pop. about 23,000. It is in a fertile, well irrigated tract, is surrounded by an irregular line of walls, and has considerable trade. It contains many temples and several large and animated caravansaries. The adjacent plain has been the scene of several battles, the most important of which are the rout of Ibrahim by Baber in April, 1526, and the great battle between the Afghans and Mahrattas, in January, 1761, in which the latter were defeated and the way was prepared for British supremacy. (See INDIA, vol. ix., p. 209.)

PANIZZI, Sir **Anthony,** librarian of the British museum, born at Brescello, in the duchy of Modena, Sept. 16, 1797. He was educated at the university of Parma, which he left in 1818 and devoted himself to the practice of law. Having taken part in the Piedmontese revolution of 1821, he fled to England, and taught Italian at Liverpool. In 1828 he was called to the chair of Italian language and literature in London university, which he held three years. In 1831 he was chosen assistant librarian of the British museum, and in 1837 was appointed keeper of the printed books. During his superintendency of 19 years in this department, through his influence the parliamentary grants for purchases were greatly augmented, and the number of books was more than doubled. In 1856 he succeeded Sir Henry Ellis as principal librarian. In 1866 he resigned, the government awarding him his full salary as a retiring pension, and in 1869 he was knighted. He has edited Boiardo's *Orlando innamorato* and the *Orlando furioso* of Ariosto (9 vols., London, 1830-'34), Boiardo's *Sonetti e canzoni* (1835), and Dante's *Inferno* (1860).

PANJIM. See GOA, NEW.

PANNONIA, a province of the Roman empire, bounded N. and E. by the Danube, which separated it from Germany and Dacia, S. by the Save (Savus), separating it from Illyria, and W. by the Julian Alps and Mt. Cetius (now Wiener Wald), separating it from Italy and Noricum. It thus embraced the Trans-Danubian circle of Hungary, the whole of Slavonia, and parts of Croatia, Carniola, Styria, and Lower Austria. The inhabitants, mostly of Illyrian race, were divided into numerous tribes, and are described as brave and warlike, but cruel and treacherous. The Romans, by whom they were conquered under Augustus, and reconquered after a revolt and desperate struggle during the same reign, not only kept strong garrisons, but also built numerous towns and fortresses in Pannonia, among which were Vindobona (now Vienna), Æmona (Laybach), Taurunum (Semlin), Sirmium on the Save, and Mursa (Eszék). A dangerous mutiny of the Pannonian legions was quelled by Drusus shortly after the death of Augustus. The province was subsequently divided into Upper and Lower Pannonia, the former being the western, and partly separated from the latter by the Arrabo (Raab). In the reign of Galerius a part of Lower Pannonia was erected into a province under the name of Valeria. The three provinces subsequently formed part of the Illyrian division of the empire. During the last period of the western empire Pannonia was successively occupied by the Huns and the Ostrogoths, and after its fall by the Longobards and other barbarians. The name Pannonia is frequently used for Hungary by writers of that country.

PANOLA. **I.** A N. W. county of Mississippi, intersected by the Tallahatchie river; area, about 750 sq. m.; pop. in 1870, 20,754, of whom 12,585 were colored. Its surface is generally level or rolling, and the soil fertile, especially in the low lands. The Mississippi and Tennessee railroad passes through it. The chief productions in 1870 were 20,408 bushels of wheat, 390,767 of Indian corn, 36,531 of Irish and 58,395 of sweet potatoes, and 15,764 bales of cotton. There were 2,147 horses, 2,361 mules and asses, 3,085 milch cows, 6,137 other cattle, 2,952 sheep, and 17,385 swine. Capital, Panola. **II.** An E. county of Texas, bordering on Louisiana, intersected by the Sabine river and drained by its branches; area, 750 sq. m.; pop. in 1870, 10,119, of whom 3,727 were colored. It has a gently rolling surface covered with extensive forests of pine, oak, walnut, ash, and hickory, and a fertile soil. The chief productions in 1870 were 306,665 bushels of Indian corn, 66,828 of sweet potatoes, 60,280 lbs. of butter, and 9,367 bales of cotton. There were 1,739 horses, 1,174 mules and asses, 3,806 milch cows, 8,811 other cattle, 4,492 sheep, and 18,796 swine. Capital, Carthage.

PANORMUS. See PALERMO.

PANSY. See VIOLET.

PANTHEISM. See PHILOSOPHY.

PANTHEON (Gr. πᾶν, all, and θεός, a god), literally, a temple dedicated to all the gods. The most famous structure of this kind is that in Rome, erected by M. Agrippa, the son-in-law of Augustus, 26 B. C., and consecrated in 608 by Boniface IV. as a Christian church, under the name of Sancta Maria ad Martyres, but which is still commonly called the Pantheon. It stands in a piazza between the Corso and the piazza Navona, near the centre of the ancient Campus Martius, and after the lapse of 19 centuries is the best preserved of the monuments of ancient Rome. It is a rotunda, 143 ft. in diameter, surmounted by a dome, of which the summit is 143 ft. above the pavement. (See DOME.) The most remarkable feature of the Pantheon is its Corinthian portico, 110 ft. in length by 44 in depth, composed of 16 granite columns, with marble capitals and bases, disposed in a triple row, each column being 46½ ft. high and 5 ft. in diameter. These columns support a pediment, a large portion of the bronze roof of which was removed by the emperor Constantius II. and the remainder by Pope Urban VIII., to make columns for altars and cannons for the castle of Sant' Angelo. Benedict XIV. removed many fine marbles from the interior to decorate other buildings. Other features of the Pantheon, such as the bronze doors, the niches and *ædiculæ*, the marble cornice and the mosaic pavement of the interior, are in excellent preservation, and give an adequate idea of the original splendor of the edifice. An inscription on the frieze of the portico shows that it was erected by Agrippa in his third consulate, while another below records repairs by the emperors Septimus Severus and Caracalla. It contains the tombs of Raphael, Annibale Carracci, and other celebrated painters.—The Pantheon or Ste. Geneviève's in Paris is in the shape of a Greek cross formed of four aisles uniting under a dome 66 ft. 8½ in. in diameter at the base, and 258 ft. in height from the floor to the top of the lantern. (See DOME.) The height of the edifice is 190 ft. from the ground, the length externally 340 ft. It was built at the instance of Mme. de Pompadour to replace the old church of Ste. Geneviève, the patron saint of Paris. It was begun by the architect Soufflot in 1764, was finished in 1790, was dedicated in 1791 as a Pantheon to perpetuate the memory of illustrious citizens, was made a church in 1822, became once more a Pantheon in 1831, and in 1853 was restored to religious purposes. In the insurrection of June, 1848, it was a refuge for some of the insurgents, and the interior was somewhat injured by cannon balls fired at them through the west doors. In 1871 the vaults were stored with vats of petroleum and barrels of powder, the communists intending to blow up the building; but it was taken from them on May 24, and the explosion was prevented. The crypts contain cenotaphs and tombs of Voltaire, Rousseau, Soufflot, Lannes, Lagrange, and other eminent men.

PANTHER (*felis pardus*, Linn.), a large African spotted cat, considered by Temminck and most modern naturalists as a variety of the leopard (*F. leopardus*, Linn, or *L. varius*, Gray), but regarded by Cuvier, Hamilton Smith, and others, as a true species. Skins of all the spotted cats vary so much, even the two sides of the same animal being unlike, that it is difficult to pronounce on the identity of these two animals; travellers and furriers consider them the same, and naturalists have been ready to follow their opinion. The description of the panther by Linnæus is false, and others of the older naturalists confound this animal with the jaguar (*F. onca*) of South America. Cuvier gives them as separate, this animal being the *pardalis* of the Greeks and the *panthera* of the Romans, and says if any leopard was by them confounded with it, it was the cheetah or hunting leopard (*F. jubata*). If not distinct species, the panther and leopard are very marked varieties. The former is more powerful, darker colored, with the crowded markings arranged with considerable regularity, and the tail longer in proportion; H. Smith describes one as 5¼ ft. long without the tail, and 2¾ ft. high at the shoulder; of a buff yellow color, approaching to ochrey on the back and sides, and with no white anywhere; with seven vertical rows of imperfect dark rings on the sides, each formed by an assemblage of five or six simple spots, darkest within the rings, descending even to the knees; the tail spotted to the end, and a narrow black bar across the lower part of the throat; in the leopard the rings are more numerous and the spots smaller. This is probably the animal so abundantly supplied to the public spectacles of ancient Rome, hundreds having been exhibited together. The panther is less common than the leopard, and confined chiefly, if not entirely, to Africa; it is an expert climber, very active, and readily trained; the female is gravid nine weeks, and the young are born blind. The panther of South America is the jaguar, and of North America the cougar. (See LEOPARD.)

PANTICAPÆUM. See KERTCH.

PAOLI. I. Pasquale, a Corsican patriot, born near Morosaglia in 1726, died in London, Feb. 5, 1807. His father Giacinto was a leader of the Corsicans in their struggles against the Genoese and the French. Being exiled, he went in 1739 to Naples. There Pasquale was educated, and subsequently served as an officer in one of the Corsican regiments of Naples, formed of refugees from that island. In 1755 he returned to Corsica, was unanimously chosen for the annual magistracy, and in a *consulta*, held July 16, was offered the supreme command of the troops. He shared the command, however, with Mario Matra, who was killed in 1757, when Paoli procured from the *consulta* the confirmation of his rank as general for life, and, pursuing the war against the Genoese, beat them back from the interior of the island, hemmed them in within a few seaports, defeated their army under Grimaldi, and organized a navy that seriously interfered with their trade. Turning his attention next to civil affairs, he established permanent courts, introduced uniformity of weights and measures, regulated the coinage, encouraged agriculture, manufactures, and commerce, instituted a national printing press, and opened a university at Corte. In 1765 he was visited by Boswell, whose journal, published in 1768, contributed much to Paoli's European reputation. In 1767 he again repelled the Genoese, and captured the island of Capraja. The Genoese then sold their right to the French, and another and more terrible conflict began. At first Paoli checked the advance of the invaders under Marbœuf and Chauvelin, and routed them at San Nicolao and at Borgo, forcing them to seek refuge within the walls of Bastia. But in 1769 an army of 22,000 men, under the count de Vaux, landed in the island, and soon completely subdued it. Paoli went to Holland, and finally to England, where he received a pension of £1,200, and lived for 20 years. The constituent assembly of France having allowed the Corsican exiles to return home, Paoli went to Paris, and was made a lieutenant general and military governor of Corsica. When the island was formed into a department, he became president of the administration and commander of the national guard. But the lawless and sanguinary proceedings of the convention soon estranged him; and, assisted by Great Britain, he organized a revolt, and was elected in June, 1793, generalissimo and president of a *consulta* which met at Corte. The French garrisons were driven from the island; English troops were landed there, and George III. was proclaimed "king of Corsica," but Paoli was treated with neglect. In 1795 he removed to England, and in the following year the island was permanently annexed to France. His biography has been written by Arrighi (2 vols., Paris, 1843), by Klose (Brunswick, 1853), and by Bartoli (Ajaccio, 1867). He bequeathed a large part of his fortune to establish schools in Corsica. **II. Clemente,** a Corsican patriot, elder brother of the preceding, born at Rostino in 1715, died there in 1793. During his exile he became a Franciscan friar. He accompanied his brother in 1755 to Corsica, was a prominent leader in the war of independence against the Genoese and French, and greatly distinguished himself in the battle of Borgo. After the battle of Ponte Nuovo he retired to a convent near Vallombrosa, and there remained 20 years, returning to Corsica an old man.

PAOLO, Fra, or **Paolo Sarpi.** See Sarpi.

PAOLO VERONESE. See Cagliari, Paolo.

PÁPA, a town of S. W. Hungary, in the county and 26 m. N. W. of the city of Veszprém, from which it is separated by the principal range of the Bakony; pop. in 1870, 14,223, chiefly Magyars. It is on a small affluent of the river Marczal, and contains a castle belonging to the family of the Esterházys, several churches, synagogues, convents, and hospitals, a Catholic and a Reformed gymnasium, and other institutions of learning. The neighboring country produces wine. Cloth, paper, and stone ware are manufactured.

PAPACY. See Pope, and Papal States.

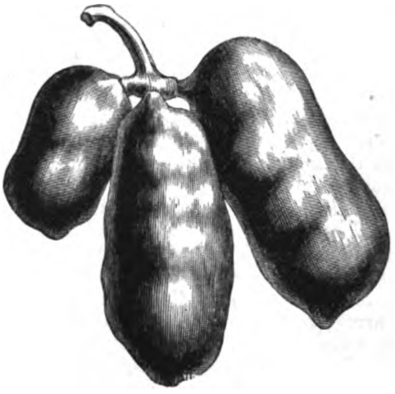
PAPAGOS, a tribe of Indians in Arizona, belonging to the Pima family, and calling themselves Papapootam. They were enemies of the Apaches and friendly to the Spaniards from an early period, and Jesuit missions were established among them; but the tyranny of the whites led to several revolts of the Papagos and other tribes. They drove the Spaniards out in 1694, but made peace soon after. On the suppression of the Jesuits the Franciscans continued their work, and the mission has lasted to the present time, the tribe being Catholic. The Mexican revolutions left the frontier exposed, and the Papagos lost heavily in war with the Apaches. They had become partly civilized. When Arizona was annexed to the United States, the Papagos were really Mexican citizens, but their status as such has not been recognized, and no treaty was made with them for their territory. Settlers entered it, and the very sites of their towns were open to preëmption. They were industrious and friendly, cultivating their small farms and working for the settlers, whose esteem they soon gained. After a time an agency was established for them, and was assigned to the Catholic church, which had been laboring among them since 1689. President Grant, by executive order of July 1, 1874, set apart a reservation of 70,400 acres for them, on the river Santa Cruz, between Tucson and Tubac, but their individual rights are not recognized. They have made peace with the Apaches, and in 1874 numbered 5,000 in 800 houses, had 89 children at school under Sisters of St. Joseph, and possessed 200 horses and 500 cattle.

PAPAL STATES, or **States of the Church,** the name formerly given to a territory of central Italy subject to the pope. In 1859, before the annexation of most of the territory to the dominions of Victor Emanuel, it extended from lat. 41° 15′ to 45° N., and from lon. 11° 25′ to 13° 55′ E., and was bounded N. by Venetia, E. by the Adriatic, S. and S. E. by the former kingdom of Naples, S. W. by the Mediterranean, and W. and N. W. by Tuscany and Modena. It was 260 m. long from the mouth of the Po to Monte Circello, and 136 m. broad from Ancona to Cività Vecchia; area, about 16,000 sq. m.; pop. 3,000,000. It was divided into a comarca, including Rome and the Agro Romano, governed by a cardinal president, six legations governed each by a cardinal legate, and 13 delegations placed under inferior prelates. Of these the legations of Ferrara, Bologna, Ravenna, and Forli constituted the district of Romagna; Spoleto and Perugia formed that of Umbria; while Pesaro, Urbino, Ancona, Macerata, Fermo, and Ascoli were called the Marches (It. *marca*, an old term denoting a frontier territory governed by a marquis). The principal cities were Rome, Bologna, Ancona, Ferrara, Ravenna, Sinigaglia, Faenza, Jesi, Perugia, Benevento, Pesaro, Macerata, Rimini, Fano, Forli, and Fermo. In 1859 the Romagna detached itself from the papal rule, and in 1860 the Marches and Umbria were occupied by the Sardinians, and the Papal States were thus reduced to the divisions of Rome, Viterbo, Cività Vecchia, Velletri, and Frosinone (area, about 4,500 sq. m.; pop. 700,000). This remnant was annexed to the kingdom of Italy in 1870. For the description of the coast lines on the Mediterranean and Adriatic as well as of the physical aspect and geological features of the country, see ITALY.—The temporal sovereignty of the pope grew up imperceptibly out of his spiritual authority. About the time of Constantine some landed possessions seem to have been attached to the see of Rome. By the time of Leo the Iconoclast (718–'41) and Gregory II. the power of the popes had acquired importance. "Their popular election," says Gibbon, "endeared them to the Romans; the public and private indigence was relieved by their ample revenue; and the weakness or neglect of the emperors compelled them to consult, both in peace and war, the temporal safety of the city." The invasion of the Lombards, who, after capturing Ravenna, the seat of the exarch or imperial viceregent, finally laid siege to Rome itself in 741, and the neglect of the Byzantine emperors to take any measures for the protection of their Italian subjects, compelled the pope to look elsewhere for help. Gregory III. accordingly sent an embassy to Charles Martel, offering him in the name of the Roman senate and people the dignity of patrician, and imploring his assistance. Charles was preparing to cross the Alps with an army when he died, and the pope died in the same year; but Gregory's successor Zachary kept back the invaders, reestablished the exarch, and obtained the restoration of the captured cities. On his death the Lombards made a fresh invasion, the exarchate was finally overthrown, Rome was again attacked, and Pope Stephen III. called in the assistance of Pepin. The Frankish ruler marched into Italy, defeated the Lombard king Astolphus, and obliged him to give up to the pope the greater part of the exarchate of Ravenna, comprising the Pentapolis (or five cities of Rimini, Pesaro, Fano, Sinigaglia, and Ancona), and 17 other towns situated chiefly on the Adriatic. From this time the popes in all their proceedings assumed the style of temporal sovereigns. Their authority, however, was little more than nominal until Charlemagne, having completed his father's work by the total destruction of the Lombard monarchy in 774, secured to the Roman pontiffs the exarchate of Ravenna, the island of Corsica, the provinces of Parma, Mantua, Venice, and Istria, and the duchies of Spoleto and Benevento. But with this new order of things arose a new source of dispute. Charlemagne was crowned by Pope Leo III. in 800 "emperor of the Romans," and for many years his successors continued to assert an imperial authority over Italy, which was retained in name by the German emperors down to the beginning of the 19th century. In the mean time, under cover of papal grants of territory to lay barons, several powerful families had grown up in Rome and other dominions of the church, who acted as politically independent. Thus, between the pretensions of suzerainty of the emperors, the turbulence of factions, and the insubordination of petty princes, the popes of the middle ages were incessantly involved in quarrels. Many of them were exiled, imprisoned, or put to death. The party for the time dominant raised its own favorite to the pontificate, and not unfrequently there were two or more claimants for the sacerdotal crown. Gregory VII. (Hildebrand), who reigned from 1073 to 1085, made the liberation of the church from temporal oppression the chief aim of his pontificate; but his famous struggle with Henry IV. resulted in no accession of independence to the Roman states, though during his time the countess Matilda of Tuscany, Parma, Modena, and Mantua granted all her territories to the pope, renewing the grant afterward to Paschal II. The emperors refused to sanction the grant, inasmuch as Matilda, being a vassal of the empire, could not alienate her rights of sovereignty. Innocent III. was the first pope who made his states really independent. After the death of Henry VI., being appointed guardian of that monarch's infant son Frederick II., he sent his legates to many of the principal cities and towns, and the inhabitants joyfully threw open their gates, took the oaths of allegiance, and received full guarantees of their municipal rights. Otho IV. afterward ceded to him the disputed territory of the countess Matilda, but having seized several of the pope's cities he was excommunicated in 1210 and deposed. The enemies whom Innocent had now chiefly to fear were his own subjects. The feudal rights of the nobles and the municipal rights of the cities left him little direct authority; and in Rome especially his power was closely circumscribed. The senate was abolished about this time by the Romans themselves, and in its place a single officer was elected with the title of senator, and with control of the militia and judiciary. Innocent contrived to have an oath imposed upon this functionary to defend the rights of the Roman pontiff, and took into his own hands the appointment of the prefect. But in other parts of Italy the imperial power was little if at all weakened. Bologna, Perugia, and Ancona were virtually republics; and although Pope Nicholas III. in 1278 obtained from Rudolph of Hapsburg a recognition of the papal sovereignty over a certain specified territory, and a renunciation of all rights within the same which might still pertain to the imperial crown, the popes did not thereby acquire any real authority. In 1309 the papal residence was removed to Avignon, and the Roman states were torn by contending factions, of which the Guelphs were supported by the popes and the Ghibellines by the emperors. In the midst of these disorders Cola di Rienzi succeeded in establishing himself at Rome (1347), and with the title of tribune of the people enforced the laws, curbed the license of the barons, and restored peace and prosperity to the commonwealth. But his reign was short. Driven from Rome by the citizens, he languished several years in prison at Avignon, until the disorders in Italy became so violent that Pope Innocent VI. sent him back with the title of senator in 1354, in company with the legate Cardinal Gil Albornoz. Rienzi was received in triumph at Rome, but was killed in a popular insurrection at the end of four months. Albornoz gained several victories in the field, and reduced the Romagna, the Marches, and the Campagna to obedience; but his successes were only temporary. The confusion was increased soon after by a series of antipopes, who for many years divided with the legitimate pontiffs the obedience of the Christian world, appointed their own cardinals, and were sometimes in possession of Rome, whither the throne was carried back by Gregory XI. in 1377. The schism was healed in 1417 by the council of Constance, which awarded the tiara to Martin V., and the Roman states began to enjoy a more regular form of government. But Eugenius IV. (1431–'47) was driven from his capital by a popular insurrection, and a short-lived republic was instituted, which his minister Vitelleschi suppressed with great cruelty. Alexander VI. (1492–1503) subdued the turbulent nobles of the Marches; and a still further advance toward the consolidation of the state was made by the warrior pontiff Julius II. (1503–'13), who reduced the barons to obedience, joined the league of Cambrai with France, Austria, and Aragon against the Venetians, and, having secured his objects, then united with Venice to expel the French. At the time of his death the great sources of disturbance in central Italy were the wars of the French and Spaniards in the N. and S. extremities of the peninsula. His successor Leo X. (1513–'21) not only restored peace, but made some additions to his territory; and from this time the States of the Church acquired a more compact and homogeneous character. Clement VII. (1523–'34) formed a league with Venice, France, and England against the emperor Charles V., which entailed numerous misfortunes upon him. Rome in 1527 was stormed and pillaged by the imperial troops under the constable de Bourbon, and the pope was seven months a prisoner. Under Clement XI. (1700–'21) the States of the Church were invaded by the Austrian archduke Charles, and Sicily, Sardinia, Parma, and Piacenza, ancient nominal fiefs of the holy see, were transferred to other hands. Clement XIII. (1758–'69) was deprived of Avignon, Benevento, and other places, and involved in contests with nearly every state in Europe on account of his protection of the Jesuits; but Clement XIV. (1769–'74), by suppressing the obnoxious order, recovered what his predecessor had lost. The liberality and virtues of Pius VI. (1775–'99) were no safeguard against the violence of revolutionary France; and after Bonaparte had wrested from him Bologna, Ferrara, and Ravenna, and added them to the Cisalpine republic, he was dethroned in February, 1798, and carried captive to France, where he died. A republic was proclaimed at Rome by the French general Berthier, but it came to an end in 1799. In March, 1800, Pius VII. was elected at Venice, Rome being then in a state of anarchy; and in July, 1801, after the peace of Lunéville, he made a concordat with Bonaparte. The refusal of Pius VII. to expel from his dominions the subjects of all those powers who were at war with France led to a fresh invasion; in February, 1808, Bonaparte's troops took possession of Rome; in April, Ancona, Macerata, Fermo, and Urbino were united to the "kingdom of Italy;" in May, 1809, Napoleon declared the remainder of the Roman states annexed to the French empire; and soon afterward the pope was carried prisoner to France, and did not return till 1814. The congress of Vienna restored to him all the territories of the church. The pontificates of Leo XII. (1823–'9) and Pius VIII. (1829–'31) were comparatively tranquil. In February, 1831, soon after the accession of Gregory XVI., an insurrection broke out in Bologna and other places, but by the assistance of Austrian troops it was speedily suppressed. Pius IX. was elected June 16, 1846, and at once inaugurated a series of reforms and concessions. The revolution which broke out in France and northern Italy in 1848 produced a powerful effect at Rome. The pope in March issued a proclamation promising a constitution on a liberal basis, with deliberative chambers, and at the same time formed a new cabinet composed of ten laymen and only three ecclesiastics. He could not avoid taking part with Charles Albert in hostilities against Austria; and in September it became necessary to construct a new ministry. On Nov. 15, the day appointed for the opening of the chambers, the prime minister Rossi was assassinated, and the next day the populace, assisted by the civic guard, forced their way into the Quirinal and compelled the pope to accept a radical ministry. On the 24th he escaped in disguise to Gaëta, and after some ineffectual negotiating to induce him to return, the chambers at Rome appointed a triumvirate; a constituent assembly was called, which on Feb. 9, 1849, dethroned the pope and proclaimed a republic. The Roman states now entered heartily into the Italian war of independence. The government was nominally administered by Mazzini, Armellini, and Saffi, but the power was really shared between Mazzini, Garibaldi, and Avezzana. The French government resolved upon restoring Pius IX., and in April an army under Gen. Oudinot landed at Cività

Vecchia, and by July 1 the French were complete masters of the city; but the pontiff did not return to his capital until April, 1850. Supported by the French army of occupation and by the Austrians who held the Romagna, the government maintained tranquillity till 1859, when the withdrawal of the Austrian garrison from Bologna, June 12, subsequent to the defeat of the Austrians at Magenta, was the signal for a peaceful revolt of the whole Romagna, and the organization of a provisional government, which offered the dictatorship to the king of Sardinia, who in March, 1860, formally declared them annexed to the Sardinian monarchy in accordance with a vote of the inhabitants. They now constitute, with Parma and Modena, the division Emilia, so called from the ancient Via Æmilia, which traversed them. The pope enlisted a considerable force of foreign troops, and offered the command of his army to the French general Lamoricière, who accepted the post in April. Early in September, following close upon the successes of Garibaldi in Sicily and Naples, revolt broke out in Umbria and the Marches, and the insurgents on the 11th placed themselves under the protection of Victor Emanuel. Accordingly a Sardinian force under Gen. Fanti took possession of Perugia and Spoleto, while Cialdini with 50,000 men made himself master of Pesaro and Urbino, and defeated Lamoricière at Castel Fidardo (Sept. 18). After a short siege Ancona capitulated Sept. 29, Lamoricière and the troops then with him becoming prisoners of war. In November a vote of the population of the revolted provinces was taken on the subject of annexation to Sardinia, and resulted in an overwhelming majority in favor of that measure. The proclamation of Victor Emanuel as king of Italy by the parliament of Turin, Feb. 26, 1861, was followed on March 27 by a resolution affirmative of Cavour's declaration that it was essential to Italian unity that Rome should become the capital of Italy. The pontifical government vainly protested in April against the title of king of Italy assumed by Victor Emanuel; he was recognized as such by the great powers, and it now became the fixed purpose of the Italian patriots to obtain the withdrawal of the French troops from Rome and to annex that city and its territory to the new kingdom. A proclamation was issued by Garibaldi in August, 1862, and an expedition which he made to Calabria toward the end of that month to organize a general rising against the French in Rome and the temporal sovereignty of the pope, was defeated by the Italian government. The king and his ministers from that moment entered into more active negotiations with France for the withdrawal of the French flag from Italian territory, while the pope by allocutions and encyclicals appealed to the conservative sense of Christendom. On Sept. 15, 1864, a treaty was concluded with Napoleon III., stipulating for the evacuation of Rome by the French within two years. Florence became the seat of the Italian government in May, 1865. A special envoy sent by the king to the pope in April, and again in June, failed to effect either a reconciliation or a compromise; the pope feeling bound to fulfil the oath made at his coronation of preserving his temporalities in their entirety, and securing thereby the independence of his spiritual government. The liberation of Venetia by the war against Austria, in alliance with Prussia (June and July, 1866), almost completed the unity of Italy. On Oct. 29 the pope issued a solemn protest against the aggressions of the Italian government. The French army began to leave the Roman territory on Dec. 2, a small garrison being left at Rome and Cività Vecchia till such time as the holy see could recruit a sufficient volunteer force of Italians and foreigners to hold the few remaining fortresses. The advance of Garibaldi in October, 1867, was counteracted by the Italian ministry, and a French contingent was sent to Rome for the defence of the papal territory. But the defeat of Garibaldi at Mentana on Nov. 3 only increased the agitation and fury against the foreigners, the flame being fanned by the presence and publications of Mazzini. At length, after the withdrawal of the last French soldier, Aug. 21, 1870, in consequence of the French reverses in the German war, Victor Emanuel wrote to Pius IX. declaring that the occupation of Rome by Italian troops had become an imperative necessity. This event took place on Sept. 20, the pontifical garrison making but a brief resistance. The great powers were notified of it on Oct. 18; in December the Italian chambers at Florence declared Rome the capital of Italy, and on May 13, 1871, passed a law known as "the bill of the papal guarantees." By this law the pope is permitted to enjoy the rank of a sovereign, and occupy the palace and basilica of the Vatican, with a yearly revenue from the Italian treasury of $625,000. All church property in Rome and its immediate territory became the property of the nation in 1873, and a large portion of the numerous establishments have since been sold to help pay the heavy public debt. This complete change was vigorously resisted by Pius IX. Refusing to accept any portion of the revenue assigned to him, he continues to depend for his support and that of his court on gifts collected for him among Roman Catholics everywhere. With the exception of a mutual understanding between the Vatican and the royal court established in the Quirinal, for the appointment of bishops to the vacant sees in Italy, no direct intercourse had taken place between the pope and the Italian government up to April, 1875.—See Calindri, *Saggio geografico, statistico e storico dello Stato Pontificio* (Perugia, 1829); Sugenheim, *Geschichte der Entstehung und Ausbildung des Kirchenstaats* (Leipsic, 1855); and Cardinal Manning, "Temporal Power of the Pope" (London, 1874).

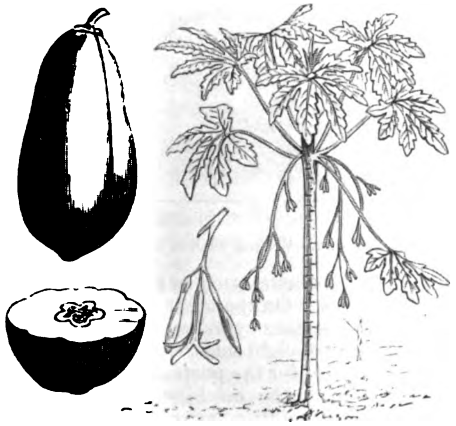
PAPAW (Fr. *papayer*), a name applied to two very different trees and their fruits, the one purely tropical, the other North American, and especially belonging to the middle states. The common papaw of this country is *asimina triloba*, of the custard-apple family or *anonaceæ*, a family of trees and shrubs having alternate leaves, without stipules; flower of a calyx with three sepals, and six petals in two rows; stamens numerous, with short filaments and several pistils, separate or coherent, ripening into a fleshy or pulpy fruit. The family, except one genus, is tropical; the soursop, cherimoyer, and other favorite fruits of warm countries belong to it. (See CUSTARD APPLE.) Our genus *asimina* derives its name from the fact that the papaw was called *asiminier* by the French colonists; in the older botanical works it is variously called *anona*, *porcelia*, *orchidocarpum*, and *uvaria;* there are four species of *asimina*, all except the papaw (*A. triloba*) being low shrubs, a form in which this is frequently found, but in favorable localities in the southwestern states it is a tree 30 ft. high, with a diameter of 6 in. or more; the presence of large papaw trees is regarded as indicative of a soil of great fertility. The trunk has a gray smooth bark, and the young shoots are covered with a rusty down, but soon become smooth; the thin obovate-lanceolate leaves are 6 to 9 in. long with short petioles; the flowers, which appear before or with the leaves, are an inch and a half across, the outer petals three or four times as long as the calyx, dull purple and veiny when fully developed, but greenish or yellowish at first; the pistils few, ripening from one to four large pulpy fruits, which contain numerous horizontal seeds. The wood is soft, spongy, and of no value; but the inner bark, which is very tough, is a strong tying material. The fruit, ripening usually in September, is 3 or 4 in. long and about a third as thick, uneven as if slightly swollen in places, its rather tender skin yellow when quite ripe; within are large flat seeds, arranged in two rows of four to nine in each; these at maturity are invested by a fleshy arillus, and all imbedded in the flesh of the fruit, which when completely ripened is of a soft, custard-like consistency and very sweet; the albumen of the seeds is divided into plates by the projection into its substance of the inner seed coat, producing the kind of albumen called ruminated, of which the nutmeg is a familiar example. The fruit is considered too sweet and mawkish by many, while some prefer it to the banana. Some trees produce in the wild state fruit of superior size and excellence, and doubtless it could be greatly improved by selection and cultivation. The resemblance in the taste of the fruit to that of the tropical papaw is probably the reason for its bearing the name. In some localities the fruit has been fermented and distilled to produce a spirituous liquor. The tree is hardy near Boston, Mass., and in central Michigan, and is sufficiently ornamental to have a place in a large collection. The remaining species are not found north of North Carolina, and extend southward to Florida. The small-flowered papaw (*A. parviflora*) is 2 to 5 ft. high, with greenish purple flowers half an inch across, and a fruit the size of a plum. The large-flowered papaw (*A. grandiflora*) is only 2 or 3 ft. high, with leaves 3 in. long, and the flowers, about 4 in. across, yellowish white. In the preceding species, the flowers appear in the axils of the leaves of the previous year, or rather just above the scars left by them, but in the dwarf papaw (*A. pygmæa*) they are produced in the axils of the present leaves; this grows in pine barrens to the height of 3 ft., but often flowers when less than 1 ft. high; its leaves are variable in size, and in the far south nearly evergreen; the flowers are pale yellow, the inner petals purplish within.—The tropical papaw is *Carica papaya*. The genus *Carica* (so named because thought erroneously to be a native of Caria) was formerly placed in a small family, the *papayaceæ;* but this, with several other small orders, has been by Hooker and

Papaw (Asimina triloba).



Papaw, Fruit.

Bentham merged in *passifloraceæ.* (See Passion Flower.) This genus consists of about 20 trees and shrubs, all natives of tropical America. This papaw is seldom over 20 ft. high, is a foot in diameter at the base, and gradually tapering upward without branching, bearing at the summit a crown of long-petioled leaves, the limb to which is often 2 ft. across, deeply cut into seven irregularly gashed lobes, which gives the tree much the aspect of a palm. The flowers, which are diœcious, are in long racemes, the males with funnel-shaped corollas, and the females with five distinct petals; the fruit is a large berry, about 10 in. long and half as broad, externally ribbed, and of a dull orange color; it has a thick fleshy rind, and numerous small, black, wrinkled seeds, arranged in five longitudinal lines along the central cavity; it is sometimes eaten raw with pepper and sugar, but is more generally cooked with sugar and lemon juice; the unripe fruit is boiled and eaten as a vegetable, and is also pickled. The juice of the ripe fruit is said to be used as a cosmetic to remove freckles, and that of the green fruit is a remarkably efficient vermifuge; the leaves are used in the French West Indies as a substitute for soap for washing linen. The tree abounds in a milky, bitter juice, which is remarkable as containing fibrine, a principle otherwise found only in the animal kingdom; Vauquelin compares the juice to blood deprived of its coloring material. Endlicher says that a few drops of this juice mixed with water will in a few moments render recently killed or old and tough meat tender, and that the same effect is produced by wrapping a piece of meat in a leaf of the tree and keeping it thus over night. It is also said that if old swine or poultry be fed upon the leaves of the tree, their flesh will be tender when killed. The root has the odor of decaying radishes. The tree is found in the extreme southern part of Florida, probably introduced from the West Indies, and it is cultivated in various tropical countries. Some other species are mentioned under Carica.



Carica papaya.

PAPENBURG, a town of Prussia, in the province of Hanover, near the right bank of the Ems, with which it is connected by canals, 23 m. S. E. of Emden; pop. in 1871, 6,077. It is situated in the midst of a moorland, and is neatly built in the Dutch style. It is the seat of an active commerce, and, after Emden, the chief port in the province, its shipping embracing about 200 sea-going vessels. It contains a school of navigation, numerous ship yards, and manufactories of sails, chains and anchors, lime and tobacco. The principal export is oak.

PAPER (Gr. πάπυρος, papyrus), a material made in thin sheets from a pulp prepared from vegetable fibre and cellular tissue.—Materials. The first paper was probably made in Egypt from papyrus, a species of reed. The stem of the plant in growing is covered at its lower portion by mud, and the layers of the outer skin at this point are whiter and more compact. Under these layers are thin pellicles, which being removed and laid side by side, their overlapping edges may be cemented together by pressure, the thickness of the sheet depending upon the number of layers placed one upon another. (See Papyrus.) The ancient Mexicans used a kind of paper prepared from the *agave Americana*, or maguey plant, which grows upon the table lands. It resembled the Egyptian papyrus, and took ink and color well, as preserved specimens attest. The Chinese rice paper is prepared from the pith of the *æschynomene paludosa*, cut spirally into a thin slice, which spread out and compressed forms a sheet of paper, sometimes a foot in length and five or six inches in breadth. The Chinese were the first to form from vegetable fibre the web which constitutes modern paper. They used the inner bark of several trees, especially the mulberry, the bamboo reduced to pulp by beating, rice and other straws, silk, cotton, and rags. The Japanese exhibited in the Paris universal exposition of 1867 beautiful specimens of paper made from the bark of the paper mulberry tree (*Broussonnetia papyrifera*). Among the numerous materials of which paper has been made are acacia, althæa, American aloe or maguey, artichoke, asparagus, aspen, bamboo, banana, basswood, bean vines, blue grass, broom, buckwheat straw, bulrushes, cane, cattail, cedar, China grass, clematis, clover, cork, corn husks and stalks, cotton, couch grass, elder, elm, esparto grass, ferns, fir, flags, flax, grape vine, many grasses, hemp, hop vines, horse chestnut, indigo, jute, mulberry bark and wood, mummy cloth, oak, oakum, oat straw, osier, palm, palmetto, pampas grass, papyrus, pea vines, pine, plantain, poplar, potato vines, rags of all kinds, reeds, rice straw, rope, rye straw, sedge grass, silk, silk cotton (*bombax*), sorghum, spruce, thistles, tobacco, wheat straw, waste paper, willow, and wool. The principal materials are: 1, cotton and linen rags; 2, waste paper; 3, straw; 4, esparto grass; 5, wood: 6, cane; 7, jute and manila.—PREPARATION OF PAPER PULP. In the manufacture of paper, the first object is to prepare the raw materials for the processes by which they are brought into a pulpy condition. 1. *Cotton and linen rags.* These are placed in cylindrical machines and tossed about by long teeth fixed on revolving cylinders, an operation called thrashing. They are then sorted according to texture, fibre, and color; next they are passed through the rag cutter, a machine which somewhat resembles a straw cutter, and are then placed in the duster, an octagonal drum covered with wire netting and revolving in a box, one end being a little elevated. After this they are usually washed preparatory to boiling. In boiling, an alkaline solution is used of variable composition, according to the nature of the rags, those more highly colored, or contaminated with grease, resin, or pitch, requiring a strong lye. Ordinarily, for 100 lbs. of rags from 6 to 10 lbs. of carbonate of soda is used, with half as much quicklime. The lye reduces the fine hard particles of the vegetable fibre, which if allowed to remain would cause knotty places in the paper, removes much of the dust which still adheres to the rags, and partially whitens them. The solution is best heated by steam pipes. Large cylindrical iron boilers are in use in the best mills in Europe and the United States. These are provided with compartments perforated with holes for draining off the water, and they are charged at the ends with several hundred weight of rags at a time, and then the steam is admitted under a pressure usually of about 50 lbs. to the square inch. The operation for the full charge requires from eight to ten hours, when the rags are ready for the process by which they are to be converted into pulp. This is done in what is called the engine or hollander, a Dutch invention substituted for what was previously known as the beating machine. An oblong vat of the shape represented in figs. 1 and 2, in both horizonatal and vertical section, is divided longitudinally in the middle by a partition so that a continuous channel is formed, as shown by the arrows. In one side is placed a solid wooden cylinder, *a*, fig. 2, armed with blunt-edged knives placed longitudinally upon the periphery. This cylinder is turned by a shaft resting in journals, *f g*. Beneath the cylinder is a block, also armed with knives similar to those in the cylinder, and having very nearly the same direction, the action of the two sets being such as to tear and separate the fibres. On the other side of the vat, opposite the beating cylinder, there is a hollow drum or prism of eight sides, covered at the ends with wire gauze for the purpose of discharging the water from the machine, so constructed that a slow revolution raises the water into the hollow shaft from which it is discharged. This is the general construction of the engine or hollander, and in nearly the same form it is used for three distinct purposes, washing, bleaching, and beating or reducing to pulp; and in these three uses it is respectively called the washing engine, the bleaching engine, and the beating engine. The rags are first placed in the washing engine, the knives in the cylinder of which are not brought down so closely upon the block as in the beater, but still close enough to tear the rags and separate the fibres to a considerable extent. Water is turned in at the cock W, and the engine set in motion, the cylinder *a* making about 150 revolutions a minute. The rags are carried around the circuit of the vat, passing beneath both cylinder and drum, the latter of which discharges the water as fast as it is received at the cock. A pipe covered with gauze in the bottom of the vat is also often used to convey away water, either during the process of washing or at its close. The washing usually takes three or four hours, when the rags are drained and placed in the bleaching engine, which differs from the other two in not having a drum for discharging water, because the bleaching solution is retained in the vat till the operation is completed. The bleaching, which is performed with a solution of chloride of lime, usually occupies about three hours. The material is at the same time made finer, and the fibres further separated, so that they will be fitted for the action of the beating engine. The half stuff, as it is called while on its way from the washer to the beater, is then let down into cisterns to drain, after which it is carried to the beating engine, and subjected to its action after the chlorine and chloride of lime and salts associated with it have been neutralized with a solution of soda or of "antichlor," a compound of sulphite of soda, chloride of tin, and

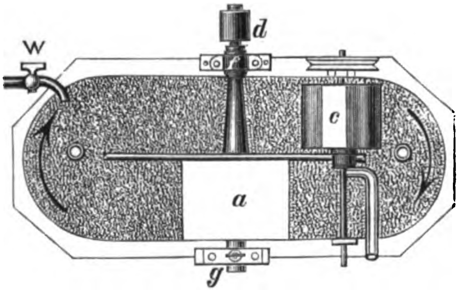


FIG. 1.—Horizontal Section of Engine.

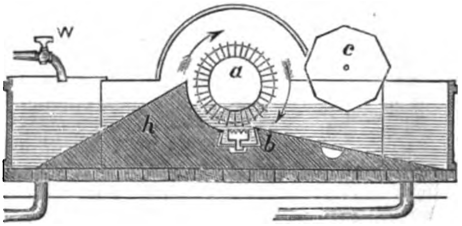


FIG. 2.—Vertical Section of Engine.

hyposulphite of soda; sulphite of calcium is also used. The engine being put in motion, the cylinder is brought down upon the block by degrees, so that in the course of three or four hours the rags are beaten into a fine pulp. When the operation is nearly completed, the paper may be colored or given a bluish tint, by the use of ultramarine, Prussian blue, indigo, aniline blue, or oxide of cobalt. Paper may be sized in the engine or in the paper-making machine; the materials used are different in the two cases. There are various prescriptions for engine size; the most common is called resin size, made by adding a solution of alum to a resin soap dissolved in soda. It is beaten up and mixed with the pulp in the beating engine before being delivered to the vat from whence it is distributed to the paper-making machine. Sizing for the machine, where the size is applied to the paper, is made of gelatine; and manufacturers generally make their own size, in a room adjoining that which contains the machine, so that it may be used while in solution, by which time in dissolving and preparing and other expense is saved. It is made of the best hide clippings, which, being softened and soaked several days in large wooden tubs of water, are then put into wooden cylinders from 4 to 6 ft. in diameter and about 10 ft. long, revolving on a horizontal shaft, by which means they are washed and cleansed of dirt. They are then put into a tub 6 or 8 ft. in diameter, made of wood or galvanized iron, and having a perforated false bottom, beneath which steam is introduced through a coil of pipe perforated with many holes. The water is not boiled, but raised to about 185° F. and kept at that point for 12 or 18 hours, dissolving the gelatine. The latter being strained, enough alum is added to it to give a slight astringent taste, which prevents fermentation and also stickiness, and adds body to the paper. Within a few years clay, china clay, and kaolin have been added to the pulp, mainly to increase the weight of the paper. The alumina of these substances has a strong affinity for vegetable matter and adheres closely to the fibres. The clay must be put into the engine before the size, as it will then reach the fibres, and the size surrounding both will better fasten the clay. All kinds of paper will carry from 5 to 15 per cent. of clay without size, and it is asserted that a small addition of it to the pulp improves some kinds of paper, making them smoother and more opaque; but too great a quantity weakens the paper and makes it brittle. 2. *Waste paper* is dusted and sorted in the same way as rags. It is then boiled and printers' ink stains removed by soda, which unites with the oil, leaving the color to subside. The boilers are stationary, so that the paper shall not be reduced to pulp too soon, and thus incorporate the coloring matter of the ink. The water is continually changed, producing a current which after a while removes the dirt. The material is put through the washing, bleaching, and beating engines as in the reduction of rags, although the bleaching and beating processes occupy much less time. 3. *Straw* is cut into short lengths with cylindrical cutters and then boiled with caustic soda. (See SODA.) It may here be stated that straw, wood, and other coarse vegetable fibre is generally boiled with caustic soda under high pressure to dissolve the resinous and gummy matters which hold the fibres together. The caustic soda, or soda ash of commerce, contains too much carbonic acid to answer the purpose of the paper maker. It must be made more caustic, and this is accomplished by the addition of caustic lime, by which the carbonic acid is removed in the form of carbonate of lime. The soda solution, after having been sufficiently acted upon by cream of lime, and the resulting carbonate having subsided, is let into revolving boilers (which may be heated by steam or by the direct application of fire, the latter being preferred), which have been previously carefully packed full of the cut straw. A boiler 16 ft. long and 6 ft. in diameter will hold about 2,500 lbs. of the straw, if carefully packed. Two or three boilers are sometimes connected for the purpose of saving fuel by blowing out the steam from one to another. After digestion the material, which answers to half stuff, is washed, bleached, and reduced to pulp in engines in much the same way as with rags. This process is known as Mellier's; more recent ones by Dixon, Ladd, Cresson, Keene, and others, by which the boiling is performed under much greater pressure, thus shortening the time, have been introduced. The pulp is usually made into paper on a cylinder machine. 4. *Esparto grass*, a spontaneous growth of the gravelly and sandy soils of eastern Spain and northern Africa, where it has for centuries been made into matting and baskets, is treated in a similar manner to straw, but makes a superior paper, as its fibres are tougher. It may be made into paper either on a cylinder or a Fourdrinier machine. 5. *Wood.* Paper was made from wood as early as from straw, but only on a small scale till the erection of the works of the American wood paper company. Charles Watt and Hugh Burgess patented the invention in England in 1853 and in the United States in 1854. One of the establishments of the company, at Manayunk, Pa., has a capacity for making 15 tons of wood pulp a day. The works were built in 1865, at a cost of $500,000. The wood used is chiefly American poplar or whitewood. It is cut into slices about half an inch thick, across the grain, being fed to a rotary disk cutter armed with strong knives in the form of cord wood 5 ft. long. One of the cutters will daily reduce 40 cords of wood to chips. The chips are placed in upright cylindrical boilers about 5 ft. in diameter and 16 ft. high, with hemispherical ends, and provided inside with perforated diaphragms, each space holding a quantity of chips equal to a cord of wood. A solution of caustic soda having a strength of 12° Baumé is then introduced, and fires are started underneath. The digestion is completed in about six hours, when the contents are suddenly emptied with violence, under a pressure of 65 lbs. to the square inch, into a sheet-iron cylinder at the side of the boiler. It is now in the form or condition of half stuff, and is passed through a washing engine; and if it is immediately used upon the spot, it is also passed through a bleaching engine and mingled with rag pulp in the beating engine, in the proportion of from 60 to 80 per cent., when it is formed into paper in the same way as pure rag pulp. If the wood pulp is to be transported to a distance, it is only passed through the washing engine, and made temporarily into a thick kind of paper on a cylinder machine for the purpose of drying and giving it a convenient form for transportation. A method of mechanically making wood pulp was invented several years ago by Heinrich Voelter of Würtemberg, and there are in Germany more than 80 establishments using his machines. The defibrer or mill consists of a coarse cylindrical stone, revolving rapidly, against which billets of wood are held by springs. The action of water which flows through the mill assists in reducing the fibre so finely that the subsequent chemical treatment is simple. The mechanical is, however, inferior to the chemical method, as it breaks up the fibres into shorter particles, so that not half as much can be mixed with rag pulp. The woods which furnish the best fibre, that is, the longest and the best adapted to felting, are pine and fir; but it is more difficult to separate the resin from them than from other woods; and as poplar and basswood, among the soft woods, make the whitest pulp, they are usually preferred. 6. *Cane.* The *arundinaria macrosperma*, the kind of cane which grows in the Dismal swamp and along the rivers of North and South Carolina, and also along the Mississippi, is about 12 ft. high, nearly white, and composed of tough strong fibres. The supply of this material is immense, and the American fibre company have patented methods for converting it into paper pulp. The Norfolk fibre company, near Norfolk, Va., and the Cape Fear fibre company, near Wilmington, N. C., are working under these patents. The Norfolk company's works are on the Dismal swamp canal and Norfolk and Weldon railroad, about 4 m. from Portsmouth. The cane is disintegrated by the Lyman process, patented in August, 1858. Strong cast-iron cylinders, 22 ft. long and 12 in. inside diameter, having strong heads at both open ends, are laid horizontally on heavy frames. Each cylinder has a dome on the top to give steam room. The cane, after having been stripped and cleaned, is introduced into both ends, and the covers fastened, when steam is admitted into the cylinders, or "guns" as they are called, until a pressure of 180 lbs. to the square inch is reached. This pressure is maintained for about 12 minutes, when by pulling a trigger the covers are suddenly unfastened, and the steam rushes out with a tremendous explosion, carrying the disintegrated cane before it. A target placed about 30 ft. from the guns receives the charge, which is reduced to a mass of brown sugary-smelling fibre. The report is equal to that of a large cannon, and may be heard many miles. The concussion of the air is so great that it is impossible to stand in the gun room without support. A gun loaded with 100 lbs. of cane can be discharged every 15 minutes. Four guns of the size above described can turn out from 16 to 24 tons of stuff in 24 hours. Nearly the full weight of the dry cane is obtained in fibres having somewhat the appearance of oakum, and in this form will make a strong spongy paper, easily saturated with liquids, and suitable for roofing and wrapping paper, boards, &c. The material may also be bleached and treated after the manner of rags, and made into a strong white paper. 7. *Manila and jute.* These fibres are products of eastern Asia, and are made into ropes and coarse bagging, which after being worn reach the paper maker. The raw material of course may also be used. The butts of the jute have recently been utilized. The process of manufacture for both materials is much the same. They are boiled in rotary boilers, although for jute butts some prefer stationary boilers like those for waste paper, believing that the revolving motion injures the fibre. The material is usually treated with milk of lime, from 15 to 25 lbs. of lime, and sometimes 50 lbs., being used for every 100 lbs. of raw material. If boiled with caustic soda, like straw, the fibres may be obtained pure and bleached and made into white paper. For ordinary brown paper the pulp may be washed and beaten ready for the machine in one engine. By partial bleaching a fine buff color may be imparted. Both Fourdrinier and cylinder machines are used in making manila and jute papers. The cylinder machine causes the fibres to be laid in one direction, so that the paper has much less strength in one than in the other direction.—MANUFACTURE OF PAPER. For wrapping, writing, or printing paper, the pulp, prepared with or without size, is carried to a vat and mingled with sufficient water to make it thin enough for spreading. Up to nearly the beginning of the present century paper was made by hand. In this process the workman uses, holding it in both hands, a shallow mahogany box somewhat larger than the sheet of paper, covered with parallel wires placed near together, and crossed by a few others. The wires thus arranged produced what is called "laid paper," but with a woven wire cloth the product is known as "wove paper." The "water mark" upon paper, used to designate the peculiar kinds, is produced by coarse wires of the required figures attached to the moulds, so as to cause the layer of fibre to be somewhat thinner on their lines. Various devices formerly made use of in this way gave names to the sorts of paper to which they were applied, and the papers have retained these names. Thus "cap" or "foolscap paper" was so called from the water mark representing a fool's cap and bells; "post paper," from the design of a postman's horn; what was called "pot paper" had the design of a pot or jug; and "hand paper" was distinguished by the figure of a hand. Water marks on bank notes, checks, and other commercial papers rendered forgeries more difficult. With the mould in the workman's hands, a loose frame called a deckle, of the exact size of the mould, is held down upon its upper surface, serving as a margin to the wires, and determines the size of the sheet. A proper quantity of pulp being dipped up and shaken with a peculiar motion acquired by experience, the fibre is spread evenly over the wires, and the water in great part flows through. The vatman then slips off and retains the deckle as he slides the mould along the edges of the vat to another workman called the coucher, and taking another mould to which he adjusts the deckle, he repeats the operation. The coucher meantime sets the mould on its edge to drain while he arranges on the table close by a sheet of felt cloth on which he lays the sheet of fibre by overturning the mould. This is returned to the vatman, who passes along another mould and sheet, and this is laid upon another felt with which the first sheet is covered. About 130 sheets are thus piled up alternately with as many felts, and the whole pile is then slipped under a press, by the action of which much water is squeezed out and the sheets acquire tenacity. These are then separated and piled up by themselves, and again pressed; and being again separated, or parted, they are piled and pressed a third time. Thus the marks of the felts are removed, and the paper is in good condition for drying, which is effected by hanging the sheets on hair lines in lofts or rooms specially devoted to this purpose. In favorable weather the drying may be completed in 24 hours, after which the paper is sized by dipping it several times in a preparation of glue and alum. The sheets are again pressed to remove the superfluous size, and are returned to the drying rooms, where they are suspended upon the lines and dried much more gradually than before, several days' time being requisite for the size to become well incorporated with the paper. The finishing is effected by pressing the sheets laid alternately with glazed paper boards with some hot metal plates interspersed through the piles. This gives the name of "hot pressed." It may instead be rolled with smooth copper plates between the sheets. By this method it was often three weeks before the paper was finally finished from the first treatment of the rags, and for every vat, from which about 150 lbs. of paper might be made in a day, there were employed eight men and about as many women.—Paper making by hand has been wholly abandoned in the United States, where even the finest bank-note paper is manufactured by machinery. In this process the pulp is thinned with water sufficiently for spreading it on the web of the machine. There are several forms of machines in use, but the Fourdrinier is the most common. As improved by Bryan Donkin and others, its action is described as follows in Knight's "American Mechanical Dictionary:" "Pulp from the beating cylinder is admitted to the chest *a* through a strainer *b*, consisting of a sheet of metal through which strips are cut; it is here constantly agitated by a stirrer *c*, and is caused to flow into a second and smaller chamber provided with a smaller stirrer, which delivers it (after passing over a channelled plate by which extraneous matters of greater specific gravity than the pulp are arrested) on to the endless wire web or apron *d;* to this a shaking movement is imparted, distributing the pulp fibre evenly over its surface. It is supported on a series of small rollers, and the width of the paper is governed by deckle straps *e* at each side, which are carried by rollers *f f*, their tension being regulated by the arrangement shown at *g;* *h* is a vacuum box

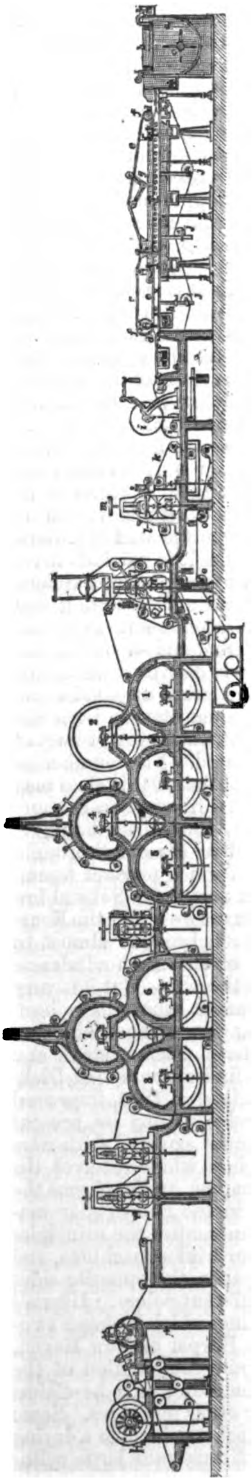


Fig. 8.—Fourdrinier Machine.

from which the air is partially exhausted by a set of air pumps, and which withdraws in part the moisture from the paper as it passes over the box. It is then carried between the cloth-covered rollers *i i*, by the lower one of which and the rollers *j j j* the wire apron returns to receive a fresh supply of pulp, the paper being transferred to the blanket felt *k*, which conveys it to the press rolls *l l;* these are solid, and over the upper one is a thin edge bar, which removes adhering particles of fibre from the roll, and also serves to arrest the progress of the paper should it stick to the roll, thus preventing injury to the blanket. The rolls are adjusted in their bearings by the screw *m*, so as to exert greater or less pressure. The blanket then conveys the sheet to a position where it may be received by the second press rolls *n n*, which further compress and expel the moisture from it, and the blanket returns by way of the rollers *o o o* to the point whence it set out. After passing the press rolls the paper is received on a second endless blanket, which carries it to the first of a series of steam-heated cylinders, 1, 2, 3, 4, 5, between which it is partially dried and conveyed between other pressure rollers, *s*, and thence to a second set of drying cylinders, 6, 7, 8, whence, after being subjected successively to the pressing and stretching action of the rolls *p p*, it is delivered on to the cylinder or reel *r*. Registering mechanism indicates when a certain quantity has been delivered on to the reel, which is then removed and a fresh one substituted. The number of drying cylinders in a machine of this class may be indefinitely increased. In some cases more than 100 are employed, the object being to allow the sizing material to become thoroughly incorporated, and to form a product resembling hand-laid paper in quality."—Several improvements have been made by which the Fourdrinier machine has been brought almost to perfection, and is one of the most admirable pieces of mechanism in the arts. But it is very expensive, for which reason others have been constructed for making the cheaper kinds of paper from coarse material, such as straw and cane. Of such is the cylinder machine of Dickenson, invented in England in 1809, improved from time to time, and attaining its present form in 1847. A cylinder covered with wire cloth revolves in the chest which receives the pulp from the beating engine, and performs the office of the wire web in the Fourdrinier machine. Scanlan's machine unites the principles of the cylinder and Fourdrinier machines, and makes a double-web paper, the opposite sides of which may be of different colors. Harris's is a two-cylinder machine, which makes a two-web paper. Mr. James Harper of New Haven, Conn., has also patented a combination of the cylinder and Fourdrinier, for which he claims several advantages over other machines. Some of the latest English machines include a drying apparatus consisting of numerous large cylinders of wire net, each having a revolving fan in the inside. The wet web of paper passes around all the cylinders in turn, deprived of some of its moisture by each fan, so that when it leaves the last cylinder it is thoroughly dry. It is said that the paper is harder and stronger dried in this way than by steam-heated cylinders.—Not many years ago paper received its finished surface by being placed between copper plates and then passed several times between powerful iron rollers or calenders. But this method has been superseded by what are known as sheet super-calenders, in which the paper is passed between rollers, one of which is made of iron and the other of compressed paper surrounding an iron shaft. The paper used in the preparation of the cylinders is of the strongest kind, usually manila, and when placed on the shaft is subjected to immense hydraulic pressure.—The varieties of paper are numerous. They may be classed in general as writing (including drawing), printing, and wrapping; and besides these are the filtering and blotting papers, which differ from the other kinds in an admixture of woollen rags, by which the product is rendered absorbent. Cartridge paper is a thick variety of white paper used for making cartridges. Bank-note paper is a very strong, flexible, and thin paper, made of the best linen rags; and tissue paper is a thin transparent paper used for tracing drawings, manifold writing, and many other purposes. The distinctions of the varieties of writing paper are based on the paper being wove or laid, and on the shades of color and degree of finish. The cream laid and cream wove are of a slightly yellowish white, and are now regarded as the choicest varieties. Papers of a bluish tint are prepared by mixing ultramarine with the pulp. A very small amount of ultramarine counteracts the natural yellow color, and produces the nearest approach to white. The light buff color is produced by oxide of iron of a low degree of oxidation, and paper of this shade has been recommended as more grateful to the eye than the glaring surface of the white varieties. The trade names of the different sorts of paper designate the different sizes furnished from the mills. The smaller sheets of letter and note paper are prepared from the commercial sheets by the stationers. The smallest sheets furnished by the mills, termed pot paper, measure 12½ by 15 inches; foolscap, the next size, 13½ by 17; post, 15¼ by 18⅝; copy, 16 by 20; large post, 16½ by 20¾; medium post, 18 by 23; sheet and a third foolscap, 13¼ by 23; sheet and a half foolscap, 13¼ by 24½; double foolscap, 17 by 27; double pot, 25 by 30; double post, 19 by 30½; double crown, 20 by 30; double medium, 24 by 38; demy, 15½ by 20; ditto printing, 17¾ by 22½; medium, 17½ by 22; ditto printing, 18½ by 23; royal, 19 by 24; ditto printing, 20 by 25; superroyal, 19 by 27; ditto printing, 21 by 27; imperial, 22 by 30; elephant, 23 by 28; atlas, 26 by 34; columbier, 23½ by 34½; double elephant, 26¾ by

40; antiquarian, 31 by 53.—Uses. Besides the manufacture of ordinary paper, the pulp, prepared from whatever materials, may be devoted to an infinite variety of uses, such as paper hangings, pasteboard, boards of different kinds, boxes, papier maché, sheathing for vessels, boats, furniture, car wheels, tubs, water buckets, and other household utensils. Both the Chinese and Japanese make furniture, clothing, hats, shoes, umbrellas, handkerchiefs, napkins, twine, and many other useful articles from this material. The Japanese make a paper cloth, known as *shifu*, which is said to bear washing. Boxes, trays, and even saucepans are made of it, and it is also made into bags for holding wine. The oil paper for water-proof clothing is prepared from a kind called *seuka*. The pieces are joined together by a cement made of young fern shoots, ground and boiled into a paste and thinned with the juice of unripe persimmons. The paper is softened by rubbing in the hands, and is coated with an oil from a seed called *ye-no-abura*. In England paper used for water pipes and tanks has been found to preserve water from freezing longer than lead will do. In 1868 Col. Muratori of the French army began experiments with a paper cuirass, light to wear, but tough enough to resist bullets. In the London international exhibition of 1872 there was shown a model house made of paper, with water flowing over it. In the United States the consumption of paper for collars and cuffs is enormous.—History. Papyrus, chiefly of Egyptian manufacture, continued in use in European countries for some centuries after the Christian era, and was finally displaced by the *charta bombycina*, or paper made of cotton, the Greek word *βόμβυξ* being in ancient times used either for silk or cotton. According to Gibbon, who cites the authority of the librarian Casiri, in the *Bibliotheca Arabico-Hispana*, the art of manufacturing paper from vegetable fibre was derived from Samarcand, where it was introduced from China in the year 651, and thence spread over Europe, having been introduced at Mecca in 707. About the same time the Saracens are said to have learned to make paper from cotton, and they brought it to Spain in 711. The bulls of the popes in the 8th and 9th centuries were written upon cotton paper. The oldest manuscript written on it in England is in the Bodleian collection of the British museum, having the date 1049. The most ancient manuscript on cotton paper in the library of Paris is dated 1050. In 1085 the Christian successors of the Spanish Saracens made paper of rags instead of raw cotton. Linen rags appear to have been used at a somewhat later period, probably first in Spain. The oldest specimen of linen paper having a date is said to be a treaty of peace between the kings of Aragon and Castile of 1177. As stated in the "Chronology of Paper and Paper Making," by J. Munsell (Albany, 1857), paper mills were in operation at Toledo in Spain in 1085, making paper from rags with the use of moulds for forming the sheets; and in 1151 the best paper was made at Jativa from raw cotton and rags, which were reduced to pulp by stamping them in mills instead of grinding after the Moorish method. In France the manufacture dates as far back as 1314, and about the same time in Germany; and in Italy it was conducted in 1367. Linen paper seems to have been common in Germany in 1324 and afterward. Though paper had long been known in England, parchment or vellum was in the time of Edward II. the writing material commonly employed. In 1390 Ulmann Strother established a paper mill at Nuremberg, in which the fibre was reduced to pulp by the operation of 18 stampers. In 1498 this entry appears among the privy expenses of Henry VII.: "For a rewarde yeven at the paper mylne, 16*s.* 8*d.*" This mill was probably that spoken of in Wynkin de Worde's *De Proprietatibus Rerum* as belonging to John Tate. Tate's mill was at Harford, and he used a water mark, which was an eight-pointed star within a double circle. John Tate died in 1514. The first mill of which there is any particular account is one built at Dartford in Kent, by a German named John Spilman or Spielman, jeweller to Queen Elizabeth. This is celebrated in a poem on paper of the date of 1588. The business made but slow progress, and during the 17th century the supplies were chiefly from France, which country, with Holland and Genoa, maintained a decided superiority in this production. As late as 1663 England imported from Holland £100,000 worth of paper. In England great improvements were introduced by the French refugees of 1685; and from this time the business advanced in importance. In 1690 particular attention began to be directed to the production of white paper, almost all that was previously made being brown. The celebrated manufacturer James Whatman had his mill in operation at Maidstone in 1770; and from that time to the present its product has been famous for its superior quality. About the same period important improvements were made in the manufacture in Holland and Germany. Cylinders armed with steel blades for reducing the pulp were substituted by the Dutch, about the year 1750, for the stampers which were before in use. They were run with far greater ease by their windmills, and proved much more effectual. The Germans attempted the use of straw in 1756; and in France in 1776 a book was printed upon paper of good white appearance made from the bark of the linden (basswood). As early as 1719 Réaumur had printed an essay suggesting wood as a material, his hint being derived from observing that the fabric of wasps' nests was from that material. The greatest advances in the manufacture were now made by the French. In 1799 Louis Robert, an employee of François Didot of Essonnes, France, introduced an invention, which was patented the same year, by which paper 12 ft. wide and of an indefinite length could be made. In 1801 the machine was again patented by Mr. Gamble, a brother-in-law of M. Didot, and was exhibited in England, where the stationery firm of Messrs. Fourdrinier made arrangements for its purchase, at the same time expending £60,000 for improvements. The first machine was put into operation by Mr. Donkin, who devised the improvements in 1803, and in 1804 the patents of Didot and Gamble were transferred to the Messrs. Fourdrinier. The expense incurred by this public-spirited firm was never returned in earnings of the machine. A bill for assistance was introduced into parliament, but was not passed, and the Messrs. Fourdrinier were obliged at last to go into bankruptcy. In 1800 good white paper to the amount of 700 reams a week was made for the first time from old waste and written and printed paper, such as had always before been thrown away. This was done in England by Matthias Koops. He also made better paper from straw, wood, and other vegetable matters, without the addition of any other known paper stuff, than had ever before been produced. He obtained a patent for the use of straw, hay, thistles, waste and refuse of hemp and flax, &c. Notwithstanding the largely increased use of other materials, in Great Britain, as elsewhere, rags are the chief material, the import in 1871 amounting to 26,757 tons, valued at £442,030, which was the largest importation ever known in that country.—William Rittinghuysen (now spelled Rittenhouse), a native of Holland, was among the early settlers of Germantown, Pa. In 1690, in company with William Bradford the printer, he established the first paper mill in America at Roxborough near Philadelphia, on a stream called Paper Mill run, a branch of the Wissahickon, about 2 m. above its junction with the Schuylkill. This mill supplied Bradford with paper while he lived in Philadelphia and after he settled in New York. The paper was made of linen rags. The second paper mill in America was erected in that part of Germantown called Crefield, on a small stream that empties into the Wissahickon near the manor of Springfield, by William De Wers, a brother-in-law of Nicholas Rittenhouse, son of the first paper maker, in 1710. A paper mill was erected in 1714 upon Chester creek in Delaware. It was afterward owned by a Mr. Wilcox, who furnished Franklin with paper from it. In the colony of Massachusetts Bay, as appears from the statement of Salmon in his "Modern History" (vol. iii., p. 494), a paper mill was set up about the year 1717, and in 1720 was making paper to the value of about £200 per annum. But other authorities give the year 1730 as the date of the first paper mill in Massachusetts, which was built at Milton under the encouragement of the bounty offered by the legislature in 1728. There was in 1728 a paper mill at Elizabethtown, N. J., owned by William Bradford. In 1768 a mill was completed at Norwich, Conn., by Christopher Leffingwell, under official encouragement. Another was in operation in 1776 at East Hartford, belonging to Watson and Ledyard, which supplied about 8,000 sheets weekly for the press at Hartford, and most of the writing paper used in the state and the continental army. There were at this time three small mills in Massachusetts and one in Rhode Island, and not long after one at Bennington, Vt. The manufacture had made more rapid progress in Pennsylvania, New Jersey, and Delaware, where in 1770 the total number of paper mills was about 40, and the annual product of paper was worth about £100,000. In New England and New York the supply was far short of the demand, and it was with the greatest difficulty that rags were procured for the mills. The first paper mill in northern New York was built in 1793 at Troy by Websters, Ensign, and Seymour, in which from five to ten reams were made daily. The next year one was constructed at Fairhaven, Vt., by Col. Lyon, and the bark of the basswood was employed in it for making wrapping paper. In 1810 the number of mills in the United States was estimated at 185, of which 7 were in New Hampshire, 38 in Massachusetts, 4 in Rhode Island, 17 in Connecticut, 9 in Vermont, 28 in New York, 60 in Pennsylvania, 4 in Delaware, 8 in Maryland, 4 in Virginia, 1 in South Carolina, 6 in Kentucky, and 4 in Tennessee. They produced annually 50,000 reams of news paper, worth about $3 a ream; 70,000 reams of book paper, worth $3 50 a ream; 111,000 reams of writing paper, worth $3 a ream; and 100,000 reams of wrapping paper, worth 83 cents a ream. In 1828 the consumption of paper by the newspapers throughout the United States was estimated at 104,400 reams, costing $500,000; and the total value of all paper made was nearly $7,000,000, and of the rags and other materials used about $2,000,000. The Fourdrinier machine, imported from England, was in use in a number of mills, Massachusetts in 1829 having six of them, or one for every ten mills. These, and improved methods of cleansing and bleaching, principally by the use of chlorine, gave a great impulse to the business. The importation of rags continued to increase, their value in 1839 and 1840 exceeding $560,000 a year. The imports of paper in each of the same years amounted to about $150,000 and the exports to $85,000. In 1850 the value of rags imported was $748,707, and of paper $496,563. Three fourths of the rags were from Italian and Austrian ports, and their cost was $3 61 for 100 lbs. The capital invested in the manufacture was about $18,000,000, the annual product of paper about $17,000,000, and the number of mills about 700, all but two of which had Fourdrinier machines. The town of Lee in Berkshire co., Mass., became celebrated for its paper mills, having 25 mills in 1851, which produced about 25,000 lbs. of paper daily and $2,000,000 worth per annum. The consumption of paper in 1852 equalled that of England and France together. In 1870 there were in the United States, exclusive of paper-hanging manufactories, 669 establishments, mainly manufacturing printing, writing, and wrapping paper, with a capital of $34,365,014, and products valued at $48,676,935. Of these, 174 in New York produced $10,301,563; 65 in Massachusetts, $6,661,886; 75 in Pennsylvania, $5,176,646; 43 in Ohio, $3,799,505; and 60 in Connecticut, $2,715,630.

PAPER HANGINGS, a covering for interior walls of buildings, made of paper and usually printed with figures and devices, as a substitute for hangings of tapestry or cloth. They came into use in Europe about 200 years ago, but have been used by the Chinese for many centuries. Since the invention of the Fourdrinier paper machine, by means of which strips of paper of indefinite length may be made cheaply, they have been common in Europe and the United States. Previous to this time squares of hand-made paper were pasted together. For most of the period during which paper hangings have been used they have been printed with blocks by hand, after the manner of calico printing or the printing of oil cloth by hand. The colors are opaque and mixed with size. In the better kinds of hangings the whole of the paper is covered and the figures are then applied. In the cheaper kinds a colored paper is used to print on. As many blocks are used as there are colors in the pattern, each block having the part of the pattern upon it which is of one color. One block is printed the whole length of the paper by a succession of impressions; the piece is then dried, and the next color applied. Cylinder printing machines are now in use, which facilitate and cheapen the process. The pattern is engraved in parts on a series of copper cylinders, to each one of which a particular color is applied as the cylinder revolves. As the paper reaches each cylinder in succession, it receives an impression of one part of the pattern in one color, the figure being completed by the last cylinder. The paper is dried after passing each printing cylinder by the back surface passing over plain heated cylinders. Copper, silver, and gold leaf are often applied, making some of the hangings very expensive. Powdered steatite or French chalk is used as the ground for satin papers, the gloss being produced by polishing. A kind called flock papers are made by coating the surface with a composition called encaustic, made of linseed oil boiled with litharge and ground up with white lead. The flock, made by cutting and grinding woollen colored fabrics, is sifted over the paper as it passes along covered with the encaustic, and is dried by warmed cylinders. Some of the finest French papers have the colors applied by hand.—Many of the colors used upon paper hangings are prepared from mineral substances, some of which are of highly poisonous character. This is especially the case with the rich greens of the flock papers, which are chiefly what is called Schweinfurt green, a very dangerous compound of arsenic and copper. Costly and elegant paper hangings of this character are now in use, the noxious influence of which seriously affects the workmen who put them up, and occasionally so vitiates the atmosphere of the apartments as to impair the health of the inmates of the house.

PAPER NAUTILUS. See Nautilus.

PAPHLAGONIA, in ancient geography, a country in the north of Asia Minor, bounded N. by the Euxine sea, E. by Pontus, from which it was separated by the river Halys (the modern Kizil Irmak), S. by Galatia, and W. by Bithynia. The chief city was Sinope, founded by a Greek colony, on the Euxine; and other important places were Cytorus and Amastris on the coast, and Pompeiopolis and Gangra in the interior. The only important rivers, besides the Halys, were the Amnias (Kara-su), its tributary, and the Parthenius (Bartan-su), on the Bithynian border. The Olgassys mountains (Ilkaz Dagh) in the centre, an extension of the chain running from Armenia to the Hellespont, send up to the northern part of the country numerous branches. Generally the surface is mountainous and rugged, especially in the southern portion, the northern containing many wide and fertile valleys. Paphlagonia was celebrated for its horses, and also produced mules and antelopes, and in some parts sheep breeding was common, while the vast forests in the south afforded an ample supply of timber. A kind of red ochre was obtained in the neighborhood of Pompeiopolis. The Paphlagonians appear to have been a Syrian race, and were rude and superstitious. The chase was a favorite pursuit in peace, and their cavalry was celebrated in war.—Paphlagonia was originally governed by native princes, but was annexed to Lydia by Crœsus; and after the conquest of that kingdom by Cyrus, it formed a portion of the third satrapy of the Persian empire, though various satraps made themselves independent rulers. After the death of Alexander, Paphlagonia fell into the hands of Eumenes; but after his fall it was again independent until it became a part of the dominions of Mithridates, king of Pontus. The Romans united the coast districts with Bithynia, and subsequently incorporated the whole country with the province of Galatia; but Constantine erected it into a separate province. It is now embraced in the Turkish vilayet of Kastamuni.

PAPHOS, the name of two ancient towns in the S. W. part of Cyprus, one of which was called Old Paphos, the other New Paphos, the former being the one usually denoted by the poets, the latter by the prose writers. Old Paphos, the seat of the worship of Venus, and reputed the place where she landed after having risen out of the sea, was about 1½ m. from the shore, and owes its legendary foundation to Cinyras, the father of Adonis. Here her worship was early established, and the huge foundations of the temple are still visible. New

Paphos, the modern Baffa, was between 7 and 8 m. N. W. of the old city, and was said to have been founded by Agapenor, chief of the Arcadians at the siege of Troy. It was also remarkable for the worship paid to Venus. This place is mentioned in the Acts in the account of St. Paul and Elymas the sorcerer.

PAPIAS, an early Christian writer, bishop of Hierapolis in Phrygia. He wrote an "Explication of the Speeches of the Lord," of which only a few fragments remain. He entertained the idea that there will be for 1,000 years after the resurrection from the dead a bodily reign of Christ on earth; and from him millenarians were sometimes called Papianists. According to the Alexandrian chronicle, he suffered martyrdom in Pergamus in A. D. 163. For the fragments of his writings see the *Reliquiæ Sacræ* of Routh (8vo, Oxford, 1814).

PAPIER MACHÉ, the pulp of paper mixed with glue or gum arabic, moulded, and dried, or paper pasted in sheets upon models. The cheaper articles of papier maché are made of white or brown paper mashed in water and pressed in oiled moulds. The better articles are produced by pasting or gluing together sheets of paper, which, when a proper degree of thickness is attained, are powerfully pressed and dried. While moist the preparation may be moulded into any form, and when dry it may be planed and rasped to shape. Several coats of varnish are next applied, and the inequalities are rubbed down with pumice stone. It is ornamented with gold, bronze powder, or colors, after which a varnish of shell lac is applied and dried at a temperature of 280°. A brilliant surface is obtained by polishing with rotten stone and oil, and by hand rubbing. For architectural ornaments, the sheets of paper prepared in layers with glue are pressed into metal moulds. When removed, a composition of paper pulp mixed with rosin and glue is put into the moulds, and the paper impressions being again inserted, the composition adheres to them permanently. *Cartonpierre* ornaments are similarly prepared, whiting being used in place of rosin, and are lighter and more durable than plaster of Paris. Papier maché is rendered to a great extent water-proof by mixing with the pulp a preparation of sulphate of iron and glue, and nearly fire-proof by adding to this borax and phosphate of soda.—Papier maché is now used as a substitute for other materials in interior decorations. From a model made in clay or plaster a plaster mould is taken, into which a thin layer of the finest pulp is poured, which is backed by a thick, coarser pulp, generally made of bamboo. The casts are so strong that they can be made of great extent, and screwed to the walls or ceilings. When mixed with clay, glue, and an alkali, the material is fire-proof; and if silicates are added, it is impervious to moisture. One of the most important properties of papier maché is the rapidity with which moulds can be taken with it from type, whereby the stereotyping of daily newspapers has been rendered possible and common. (See PRINTING.)

PAPILLON, Fernand, a French physiologist, born in Belfort in 1847, died in Paris, Jan. 2, 1874. He studied at the lyceum in Colmar and at the collége de France, attracting much attention by the ability displayed in his chemical work. In 1864 he became attached to the staff of the *Moniteur scientifique*, and from that time was a frequent contributor to scientific periodicals. Several of his essays were also published in the *Revue des Deux Mondes.* His original investigations were chiefly in chemical physiology, but he also wrote on partly metaphysical topics. His principal writings have been translated into English and published in a volume entitled "Nature and Life" (New York, 1875).

PAPIN, Denis, a French physicist, born in Blois in 1647, died in Marburg, Germany, about 1712. He practised medicine in Paris for some time, but turned his attention to mechanics, and became the assistant of Huygens. He visited England in 1680, and while there prepared his *Dissertation sur la manière d'amollir les os, et de faire cuire toutes sortes de viandes en fort peu de temps et à peu de frais, avec la description de la machine* (Paris, 1682). In this work he explained his *digesteur* or *marmite*, a contrivance for softening bones, the principle of which is still in use under the name of "Papin's digester." Having removed to Germany on account of the persecution to which he was exposed in France as a Protestant, he was appointed in 1687 professor of mathematics in the university of Marburg, and devoted his leisure to researches upon the use of steam. As early as 1690 he published the results of his labors in the *Acta Eruditorum* of Leipsic, proposing steam as a universal motive power, and describing a steam engine and even a rude paddle steamer. It appears from documents discovered by Prof. Kuhlmann in 1852 in the public library at Hanover, that in 1707 he had a vessel built in conformity with his invention, and tried it on the Fulda. His last published work was a Latin "Essay upon a new System for raising Water by the Action of Fire" (Frankfort, 1707).

PAPINEAU, Louis Joseph, a Canadian politician, born near Montreal in October, 1789, died at Montebello, near Quebec, Sept. 23, 1871. He was admitted to the bar, but never practised. At the age of 22 he entered the provincial parliament, and in 1815 was elected speaker of the house. He was the leader of the radical party, and in order to neutralize his influence, the governor general, Lord Dalhousie, appointed him one of the executive council; but he never appeared at its sittings, and continued his opposition to the government. In 1823 he went to England to remonstrate against the union of Upper and Lower Canada. In 1827 he was reëlected to the house and rechosen speaker. Rather than sanction this choice, Lord Dalhousie adjourned the parliament, and it was not till 1828 that Papineau could take his seat. He prepared a list of the demands and grievances of his countrymen, which was introduced to the house in 1834 by Bédard, and known afterward as the 92 resolutions. After supporting them in the house, at the close of the session he went through the country urging a constitutional resistance to the imperial government. He advised the colonists not to vote subsidies for more than six months, and this measure was carried out in the session of 1836; but the new governor, Lord Gosford, vetoed it, and decided upon administering the province without the assistance of parliament. While the other provinces were conciliated by concessions and favors, Lower Canada was threatened with harsh measures. Papineau strennously advocated peaceful resistance, but the liberal party took up arms, and he was not heeded. He remained with the rebels, but did not share in their military operations. As the engagements of St. Denis, St. Charles, and St. Eustache, in November and December, 1837, had demonstrated the futility of armed resistance, and as his arrest for high treason was ordered, he took refuge in the United States, and afterward lived in Paris eight years, engaged in literary pursuits. In 1847 he returned, under the general amnesty of 1840, was again elected to parliament, retired in 1854, and thereafter took no part in public affairs.

PAPINIANUS, Æmilius, a Roman jurist, born about A. D. 170, put to death in 212. He succeeded Septimius Severus as *advocatus fisci*, and when the latter became emperor (193) received the office of *libellorum magister*, and subsequently that of *præfectus prætorio*. In the second year of the reign of Caracalla he was beheaded by order and in the presence of that tyrant. Papinian was one of the most eminent of the Roman jurists. Among his pupils were Ulpian, Paulus, and others; and in the Digests are 595 extracts from his works.

PAPIRIUS CURSOR, a Roman family of the Papiria gens, supposed to have derived its name from the fleetness of foot of its founder. The following are its chief members. **I. Lucius**, master of the horse under the dictator L. Papirius Crassus in 340 B. C., the date of the first historic mention of his name. In 333 he was consul with Poetelius Libo, and according to some authorities held the consulship again in 326. In the second year of the second Samnite war (325) he was made dictator during the illness of Lucius Camillus, the consul. He had taken the field, and was about to engage the enemy, when some reason arising to throw doubt upon the auspices which he had taken before opening the campaign, he returned temporarily to Rome, giving strict orders to Q. Fabius Maximus, his master of the horse, not to join battle in his absence. Fabius violated the order, and won the signal victory of Imbrinium. Papirius, a strict disciplinarian, and unpopular with the army on this account, hastened back to punish his disobedient lieutenant; but the latter was sustained by the troops, and, on appealing to them, by the senate and people. The ill feeling of the army toward Papirius caused his defeat in his first battle, but, having conciliated his soldiers, he conducted the rest of the campaign with great success, and received a triumph. In 320, when consul for the second or third time, he again conducted a campaign against the Samnites in Apulia, which, though he was at one time hard pressed, was ultimately successful, Luceria being captured. He received a second triumph; and he was afterward thrice reëlected consul, the Samnite war continuing through all his terms. In 309 he was again made dictator under very peculiar circumstances, his old lieutenant Fabius, naturally hostile to him, being ordered to nominate him for the post. Fabius sacrificed his personal hate and made the nomination; and Papirius hastened to the relief of the hard-pressed Roman army under Marcius in Apulia. After some little manœuvring he gained a decisive and final victory over the Samnites, and, returning to Rome, celebrated a third triumph of peculiar magnificence. His death is believed to have occurred soon after. **II. Lucius**, son of the preceding, possessed military talents hardly inferior to his father's; and, having been made consul in 293, conducted much of the third Samnite war, as his father had of the second. He ended a successful campaign in Campania by great victories near Aquilonia, and celebrated a triumph. Soon afterward he dedicated a temple erected by his father in honor of Quirinus, and placed near it the first sun dial set up at Rome. In 272 he was elected consul a second time, subdued the Bruttians and Lucanians, and was granted the honor of a second triumphal entry into the city.

PAPPENHEIM, Gottfried Heinrich, count, an imperial general in the thirty years' war, born May 29, 1594, died at Leipsic, Nov. 7 (new style 17), 1632. He received a liberal education at Altdorf and Tübingen, and travelled extensively. His zeal for the Roman Catholic faith leading him to adopt the profession of arms, he became a captain of cavalry, and was soon distinguished for his daring and courage. At Linz he joined the Bavarian army, and was made lieutenant colonel. At the battle of Prague, in 1620, he received 20 wounds, and was left for dead on the field. In 1623 the emperor appointed him commander of a regiment of cuirassiers, afterward celebrated under the name of Pappenheimers. He fought in Lombardy till 1626, when he was recalled to put down an insurrection of Protestant peasants in Upper Austria, who had resorted to arms to defend their faith. This revolt, in which 40,000 peasants perished, he crushed in a month; the history of it he himself wrote. He assisted Tilly in his campaign in northern Germany against Christian IV. of Denmark, and in May, 1631, bore a leading part in the storming of Magdeburg. In the sack of this city his troops acted with the greatest ferocity. In the defeat at Leipsic, Pappenheim received seven wounds and owed his life to a peasant. After the death of Tilly he joined Wallenstein, and in the battle of Lützen (Nov. 6) received a mortal wound, and was carried to Leipsic.—See Hess, *Gottfried Heinrich, Graf von Pappenheim* (Leipsic, 1855).

PAPPUS, Alexandrinus, a Greek geometer, who flourished according to Suidas in the latter part of the 4th century of our era, though by some modern critics he has been placed in the latter half of the 2d. He wrote several works, all of which have perished except the last six out of the eight books of the "Mathematical Collections." There is no edition of the Greek text, but two have been printed of the Latin version; a portion of the original was printed by Dr. Wallis (London, 1688).

PAPUA, or New Guinea, the largest island in the world, with the exception of Australia and possibly Borneo. It is included in the Australasian division of Oceania, and lies between lat. 0° 6′ and 10° 45′ S., and lon. 130° 45′ and 151° E., directly E. of the Indian archipelago and N. of Australia, from which it is separated by Torres strait, bounded S. W. by those portions of the Indian ocean known as the Banda and Arafura seas, and elsewhere by the Pacific. Its length N. W. and S. E. is about 1,500 m., maximum breadth 400 m.; estimated area, from 260,000 to upward of 300,000 sq. m. Papua is less known to civilized man than any other region of equal extent on the earth. Until recently even the principal features of the coast had not been accurately determined, and no European had ever been able to advance more than a few miles into the interior. The island is of irregular outline and deeply indented by several large bays, which form extensive peninsulas of its eastern and western extremities, while the more compact portion is situated between the 135th and 145th meridians. Thus on the N. coast, near lon. 135°, Geelvink bay, over 150 m. wide at its mouth, penetrates 120 m. southward, approaching within some 30 m. of the waters of Etna bay on the S. side of the island. The peninsula so formed trends W. N. W. from the narrow isthmus between these bays, and is indented in turn by McClure inlet from the Banda sea, which extends inland to within 18 m. of Geelvink bay on the opposite coast. A second peninsula stretches thence westward to Galewo strait, 2 to 3 m. wide, between Papua and the neighboring island of Salawaty, and northward to a point called the cape of Good Hope, in lat. 0° 6′ S., lon. 132° 30′ E. The great peninsula forming the eastern end of the island may be considered as beginning at a line drawn from Astrolabe bay on the N. coast, near lon. 146°, directly S. to the head of the gulf of Papua, on the S. coast, a body of water about equal in extent to Geelvink bay. It terminates near the Louisiade archipelago, not in a single point, as represented on all but the latest maps, but in a broad fork consisting of two promontories, of which the northern is much the narrower, separated by Milne bay, an arm of the sea 20 m. long and about 8 m. wide. This appears by the survey made in 1873 by Capt. Moresby of the British navy. The N. E. coast of this large peninsula borders on Dampier strait, between Papua and the island of New Britain, and is indented by Huon gulf. The most important inlet on the N. side of the main body of the island is Humboldt bay, near the 141st parallel of E. longitude, W. of which the Dutch claim dominion over the whole country. Jobie and several other islands of considerable size are situated near the mouth of Geelvink bay; and Prince Frederick Henry's island, close to the S. coast, from which it is separated by Dourga strait, is about as large as the Moluccan island of Booro. The Key and Arroo groups lie S. of the western portion of Papua. The sea surrounding the island is deep on the Pacific side, but shallow toward Australia, in which direction it does not exceed 100 fathoms in depth.—Papua is a mountainous island, subject to a hot, damp climate, and clothed with a luxuriantly rich forest vegetation throughout its known extent. But few large rivers have been discovered. Mountains are visible in the interior from all parts of the coast. The principal chains are the Arfak range, in the N. W. peninsula, with a maximum altitude variously calculated at from 7,000 to 9,500 ft.; the Snowy mountains, E. of Geelvink bay toward the middle of the island, of similar altitude, and so called because snow is said to have been seen upon their summits; and the Stanley range, from 9,000 to 13,000 ft. high, in the S. E. peninsula. Volcanic action is not known to occur in Papua, although Dampier reported volcanoes on the N. E. coast opposite New Britain in 1699. Earthquakes are infrequent, and seldom severe. The coast of the N. W. peninsula is of coral formation, as also are the adjacent islands, but nothing is known of the geology of the interior. The great height of the Papuan mountains and their distance from the coast have led to the inference that there must be large streams in the country; among the most considerable as yet known is the Amberno, described by the German traveller Meyer as sending volumes of fresh water into the sea at the N. E. end of Geelvink bay.—The climate of Papua is warm and moist. During the wet season the rains on the coast are exceedingly heavy, and malarial fevers are prevalent. The flora resembles that of Borneo in the varied and luxuriant vegetation of the hot and damp tropical forests. Little is known, however, of the natural history of the island except what relates to its fauna. A dense growth of mangroves lines much of the S. coast W. of Torres strait, and the forest trees here reach a height of 200 to 250 ft. Of the 17 Papuan mammals, all are marsupials but three, of which two are bats and one is a species of pig (*sus Papuensis*).

The tree kangaroo is the most characteristic of the marsupials, which order is represented further by the flying opossum and four species of *cuscus*. According to Wallace, the birds of Papua are more numerous, more beautiful, and afford more new, curious, and elegant forms than those of any other island on the globe. Eleven species of birds of paradise are known to inhabit the island, of which eight are not found elsewhere except in the closely contiguous island of Salawaty. There are 30 species of parrots, among them the largest and smallest parrots known to ornithologists; 40 species of pigeons, including the beautiful crowned pigeons; and 16 species of kingfishers. The cassowary is also included among the 108 genera of Papuan land birds. Meyer's recent researches on the herpetology of this region show that there are 63 different forms of reptiles and batrachians in Papua and the adjacent islands, comprising more than 30 species of lizards, 16 serpents, of which one is allied to the Australian carpet snake, and one tortoise besides the marine tortoise. Insects are exceedingly numerous and noted for their beauty of form and color. Wallace collected 1,000 distinct sorts of beetles in a space of one square mile during a three months' residence at Dorey. The zoölogical affinities of Papua and Australia, together with the shallowness of the intervening sea, have been regarded as strong evidence of the former existence of land communication between these two vast islands.—There is no means of forming any trustworthy estimate of the population of Papua. The inhabitants belong to the typical Papuan race, and have a facial expression not unlike that of Europeans. (See Papuan Race and Languages.) No other indigenous race has been met with on the island. The double extremity of the S. E. peninsula, visited by Capt. Moresby in 1873, although very rugged and mountainous, is intersected by fertile valleys, which are well cultivated by the natives, who there excel as agriculturists. Their villages in this region are described as singularly neat, in which respect they contrast favorably with those in the N. W. part of the island near Dorey, where the houses are built on poles 15 ft. above the ground. Recent travellers report the prevalence of cannibalism in numerous localities, but its existence does not seem to be proved.—The government of the Netherlands is the only European power having colonial possessions in Papua. The area under Dutch control is said to be about 29,000 sq. m., with an estimated population of 200,000. The territory which has long been claimed by the Netherlands, however, is much more extensive, comprising nearly half the island. Dorey, a small village situated on a fine harbor on the N. side of the N. W. peninsula, is one of the principal Dutch stations frequented by European and Mohammedan traders. There are missionary posts in this part of Papua. Birds of paradise, tripang, wild nutmegs, and tortoise shell are among the chief articles of export in the active trade carried on with the Moluccas.—Papua was discovered in the early part of the 16th century by the Portuguese, by whom it was named New Guinea from the striking resemblance between its inhabitants and those of Guinea in Africa. The Dutch in 1828 built a fort called Dubus on the S. E. coast, but the climate proved so unhealthy that they were forced to abandon it. They subsequently succeeded, however, in establishing trading stations at various localities. The S. E. coast was explored in 1845 by the Fly, a British government vessel, and in 1846 by the schooner Bramble. Another expedition in the British ship Rattlesnake in 1848 discovered the Stanley range, one peak of which was ascertained to be 13,205 ft. above the sea. A successful effort to complete this survey was made in 1873 and 1874 by Capt. Moresby of the British navy, in the ship Basilisk, who carefully examined the S. coast from Torres strait to the E. end of the island, and the N. coast thence westerly to Astrolabe bay. A Dutch scientific commission visited the W. part of Papua in 1858. The natural history of that region was investigated by A. R. Wallace in the same year; by D'Albertis and Beccari in 1872; and by Meyer, the German naturalist, in 1873.—The most recent work on Papua is "Wanderings in the Interior of New Guinea," by J. H. Lawson (London, 1875), whose statements, however, have been called in question.

PAPUAN RACE AND LANGUAGES. The Papuans are the original inhabitants of the islands of the Indian and Pacific oceans, but, driven out or extirpated from the coasts by the Malayo-Polynesian races, they are generally in possession of only the interior and inaccessible portions. The name Papua is derived from the Malay *papuvah*, crisp-haired, a descriptive term applied to the people. The Indian archipelago is considered the primitive home of the Papuans. Though the Malays have intermixed but little with the Papuan race, it is necessary to distinguish between pure Papuans and mixed Papuans. In the former class are counted the inhabitants of Papua, of the Key, Arroo, Mysol, Salawaty, and Waigioo islands, as well as the Aetas or negritos of the Philippines. (See Negritos.) It is still doubtful whether also the inhabitants of Borneo, Celebes, and Gilolo belong to the pure division of the race, but most ethnologists agree in considering as such the Semangs on the peninsula of Malacca, as well as the Andaman and Nicobar islanders. To the class of mixed Papuans really belong all the tribes of Oceania east of the aboriginal home of the Papuans. Consequently Wallace is inclined to treat all the Polynesian races as mixed Papuans, yet this designation should be applied to them only where there has been a nearly complete typical change. As such are reckoned the Alfuros on the northern peninsula of Gilolo, the aboriginal population of Ceram, Booro, Timor, the islands west of Timor as far as Flores, and the Sandalwood islands as far as Timorlaut. The principal seat of the mixed Papuans is Melanesia, and especially the Feejee islands, where the straight-haired Malay has been totally absorbed by the crisp-haired Papuan. Wallace describes the typical Papuan as of a deep sooty brown or black, and having crisp hair, growing in tufts, attaining such a length as to permit the making of a sort of peruke. The face has a crisp beard, and even the arms, legs, and chest are more or less covered with such hair. The stature equals or exceeds that of the average European. The legs are long and thin, and the hands and feet are large. The nose is bent, and the wide nostrils are somewhat concealed by the prolonged tip. The mouth is large, and the lips are thick and puffed up. The Papuan is impulsive and demonstrative in language and action. He is intellectually superior to the Malay, and his inferior position in civilization must be ascribed to a lack of contact with cultured races. A very wide difference seems to exist in the state of society in different parts of Papua. The inhabitants of the S. and W. coasts, having been for ages in communication with the people of the Indian archipelago, more especially with those of the Moluccas, live in comparatively comfortable dwellings, and are decently clothed; they build large rowing and sailing boats, and have a knowledge of iron; they cultivate some ground, and have two domestic animals, the hog and the dog. Toward the north the tribes become gradually more barbarous, and in some districts wear little or no clothing, though a covering of shells or leaves for the loins is not uncommon. They are very elaborate in their coiffures, and some apply a sort of caustic which turns the hair red or flaxen. Though tattooing with the needle is seldom practised, they produce little scars on the body which they burn black or red with a hot coal. Nose, ears, neck, and arms are adorned with rings, shells, bones, and similar appendages. Their villages, commonly on the banks of rivers, resemble the recently discovered lake dwellings of central Europe. The huts are built on poles, and are generally 5 ft. high, 6 ft. broad, and about 100 ft. long, and covered by a steep roof about 20 ft. high. The floor is laid with bamboo canes, but so widely apart that the river is seen flowing underneath. The interior is generally divided by a corridor into halves, and these again into various apartments. In several villages they have tracts of cultivated land planted with tobacco, palms, &c. Their arms consist of a bow and arrow, a lance, and a peculiar kind of club, 4 ft. long, very thin and narrow at one end, and broad and many-cornered at the other. They use a blow-gun made of a bamboo reed of considerable length, with which they blow dust into the air as a signal. Every man has as many wives as he can buy and maintain; but it is said that the negritos live in monogamy, and that the women may refuse their suitors. After the dead have been buried two years their bones are unearthed and put into a grotto or cave, and until this has been done no widow is allowed to marry again. Of their religious conceptions but little is known. Their musical instruments are of the rudest kind, and the height of their art is to play very loudly on them.—The languages spoken by the Papuans are not sufficiently known to admit of treating them for comparative purposes, or to form a hypothesis as to their connection with other families of speech. The dialects spoken in Papua seem to possess a certain degree of relationship to each other, but to what degree they are related to the negrito idioms cannot be determined. In the districts of Minahasa and Gorontalo in Celebes, and on the coasts of Tomini bay, no fewer than 23 dialects have been investigated by Riedel, and on the whole island there are at least 100 dialects. The variety of the dialects in Papua is still greater, for, with the exception of the S. W. coast, no political organization has been formed on the island. Every village has its own dialect, and the terms for the commonest objects are entirely different. Dr. A. B. Meyer's treatise *Ueber die Mafoor'sche und einige andere Papúa-Sprachen auf Neu-Guinea*, read in 1874 before the Vienna academy of sciences, is the first attempt at a grammar of a Papuan dialect. Previous to this the only material furnished was a few short vocabularies of some dialects, like those contained in Ottow-Crookewit's *Nieuw-Guinea ethnographisch en natuurkundig onderzocht en beschreven* (Amsterdam, 1862), which good authority pronounces untrustworthy, and the 117 words given in A. R. Wallace's "Malay Archipelago" (London, 1869), comparing Papuan and Malayo-Polynesian dialects. The vocabularies added to his treatise by Dr. Meyer are so far the largest given. The Mafoor language is spoken by Papuans originally inhabiting the island of Mafoor, but now occupying the island of Manasvari, usually called Mansinam after the chief town, on the island of Rohn or Ruhn, and in Papua near the bay of Dorey. It is very rich, always having several terms for one and the same thing. In words denoting abstractions it is necessarily poor. There is no definite article. The nouns are mostly stems; but few are derived or compound. Gender is confined to the sex of organic beings. The plural number is formed by adding to the noun the personal pronoun of the third person plural. The genitive is formed by prefixing *ro*, and the dative by *be*. Adjectives follow their nouns, and are themselves followed by *weer* for the comparative, and by *kakú* for the superlative degree. The first ten cardinal numbers are: *osseer*, *suru*, *kior*, *fiak*, *rim*, *onem*, *fiek*, *waar*, *siō*, and *samfur*. The personal pronouns are: *aja*, *j*, *j'*, I; *awe*, *wa*, *w'*, *au*, thou; *de*, *d'*, *i*, he; *inko*, *ko*, *k'*, we; *imgu*, *mgu*, *mg*, you; *si*, *s'*, they. There are also dual forms: *nu*, *n'*, we two; *mu*, *m'*, you two; *su*, *s'*, they two. Possessive, demonstrative, and interrogative pronouns are also used. Verbs are always used in connection with a personal pronoun affixed, but do not admit of inflection. Tense and mood are indicated by special words, and only the present, past, and future are distinguished. There are also various adverbs of place, time, affirmation, negation, and doubt, as well as a large number of prepositions, conjunctions, and interjections.—See Friedrich Müller, *Allgemeine Ethnographie* (Vienna, 1873); Peschel, *Allgemeine Völkerkunde* (2d ed., Leipsic, 1875); and the works cited above.

PAPYRUS, the ancient name for paper, and for the plant which furnished the material from which it was made. The papyrus plant or paper reed belongs to the family of *cyperaceæ* or sedges, nearly related to the grasses, and as remarkable for the small number of its useful plants as the grasses are for their many valuable species. The papyrus was named by Linnæus *cyperus papyrus ;* but later botanists, regarding this and several other species as sufficiently distinct, admit the genus *papyrus*, and call it *P. antiquorum*, a name which is generally adopted. It was called *papu* by the Egyptians, whence the Greek *πάπυρος* and our paper. Herodotus calls it *byblus* (*βύβλος*, whence the Greek *βιβλίον*, book, and our word Bible), and Strabo *biblus hieraticus.* It grows on the marshy banks of rivers in Abyssinia, Syria, and Sicily, and formerly abounded on the banks of the Nile; but according to Sir Gardner Wilkinson, it has disappeared from Egypt, and some think it never was indigenous there, but was a native of Syria and Abyssinia, and has become extinct from want of culture. It has been seen in modern times in Abyssinia, in the neighborhood of Jaffa, on the banks of the Anapus near Syracuse, and according to some on the borders of Lake Menzaleh in the delta of the Nile; but the last was probably another species, and it is doubtful if the Sicilian plant is the *papyrus antiquorum*, although it closely resembles it. The plant has large and abundant rootstocks, which spread in the mud and throw up numerous stems from 5 to 10 ft. high, the lower portion being submerged; the stem is triangular and smooth; the leaves all spring from near the base, the upper part of the stem being quite naked and bearing its inflorescence at the apex in the form of a large compound umbel; this consists of numerous slender branching peduncles, bearing at their extremities the flowers in small heads or spikes, and forming a graceful drooping tuft, which has at its base an involucre of long narrow leaves; the small flattened spikes consist of six or more glumaceous flowers. The papyrus is frequently cultivated as a stove plant, both as a curiosity and for its merits as a decorative plant, its tall naked stems, each bearing a delicate waving green umbel at the top, making a well grown specimen a splendid object. Though aquatic, it can be cultivated in pots if freely watered, and may be planted in the open ground in summer if it can have a moist place or sufficient water. Another plant is sometimes found in cultivation as the papyrus, the related *cyperus alternifolius ;* this is smaller in every respect, and its much smaller heads or umbels are coarser and lack the graceful drooping character of those of the papyrus, but it is much more hardy.—The right of growing and selling the papyrus was a government monopoly in Egypt, where its cultivation was restricted to the Sebennytic and Saitic nomes. It was used for a great variety of purposes besides paper. Its graceful plumes crowned the statues of the gods and decorated their temples; its pith was eaten as food; wickerwork boats, boxes, and baskets were woven of its stalk, and of its bark were made sails, cordage, cloth, mats, and sandals for the priests; it was applied as medicine to the cure of fistulas and ulcers; it furnished material for torches and candles, and its roots were used for fuel and manufactured into furniture and household utensils. Wilkinson thinks however that some species of *cyperus*, and not the *P. antiquorum*, was used for many of these grosser purposes. In making paper the inner cuticle of the stalk was separated into thin laminæ by a sharp point. The finest were those next to the pith, and the layers, of which there were about 20, decreased in quality as they approached the outer integument, which was coarse and fit only for making cordage, mats, &c. The slips were laid side by side

Papyrus.

on a smooth flat surface and covered with a second layer placed at right angles to them, after which they were pressed so as to cause the different laminæ to adhere to each other and form a single sheet, which was then dried in the sun. Pliny says the laminæ were made adhesive by wetting them with Nile water, to which he ascribes a glutinous quality, but their own sticky sap was sufficient to hold them together. In the Roman times a thin sizing was used for this purpose. The sheets were finally beaten smooth with a mallet and polished with a piece of ivory or a shell. The breadth of the sheet was limited by the length of the papyrus slips, but its length could be extended indefinitely by placing numbers of the laminæ beside each other. When finished, the papyrus was rolled upon a wooden cylinder (*scapus*), the ends of which projecting beyond the edges of the sheet were neatly finished and ornamented. Various qualities of papyrus were manufactured, of which, according to Pliny, the hieratic, 11 digits in width, used for the sacred books, was formerly the best; but under the Roman domination two finer kinds of 13 digits' breadth, the Augustine and Livian, were made. Another quality, the Fannian, 10 digits wide, was manufactured from an inferior grade. The Saitic papyrus, made in the nome of that name, was of cheap quality, and the Tanitic was so poor as to be sold by weight. An eighth grade, not more than six fingers wide, was used only for wrapping paper. In the reign of Claudius the papyrus was greatly improved in fineness, strength, and color, by putting a new layer of the best leaves over a sheet of coarser quality. The papyrus rolls taken from the Egyptian tombs differ in size and in quality, being from 4 to 18 in. in breadth, and varying in texture and color from a coarse yellowish brown, in which the fibre is visible, to a fine silky material of smooth surface and light color. In 1753 several hundred papyri were taken from an excavation at Herculaneum, a part of which are Greek and a part Latin manuscripts. The former are from 8¼ to 12¼ in. in width, and the latter wider. They are nearly reduced to carbon, and the pages are quite black, the letters being distinguishable only in a favorable light. The utmost care, patience, and ingenuity have been devoted to unrolling and deciphering them, but with results that scarcely repaid the trouble, as no works of any consequence have yet been recovered. Attention was first called to the papyri of Egypt when the history and antiquities of that country were developed by the French expedition. A great number have since been exhumed, and through their decipherment much light has been shed on the history, manners and customs, and literature of Egypt.—Papyrus was used for writing at a very remote period in Egypt, as early probably as the third or fourth dynasty. It was an article of commerce before the time of Herodotus, but it did not come into universal use in Greece before the time of Alexander. Under his successors it was one of the chief articles of Egyptian commerce. The plant was raised also, according to some authorities, in Calabria and Apulia, and in the marshes of the Tiber; but according to others, the Romans only remanufactured and improved the papyrus imported from Egypt. In the time of the republic great numbers of hieratic papyri which had been written upon were sent from Alexandria to Rome, where they were cleaned and prepared anew for writing. Under Augustus the trade in both books and papyrus was very large. In the reign of Tiberius the demand often exceeded the supply, and it was necessary to appoint a committee of the senate to regulate its distribution. In the 7th century the conquest of Egypt by the Saracens put an end to the export, and western Europe was obliged to supply its place with parchment and vellum until the introduction of paper, although papyrus was occasionally used for several centuries after. To this general substitution of parchment, and the transferring to it of works written on the perishable papyrus, is due in a great measure the preservation of ancient literature. (See EGYPT, LANGUAGE AND LITERATURE OF, and MANUSCRIPT.)

PARÁ, or **Grão Pará**, a N. E. province of Brazil, bounded N. by Guiana, N. E. by the Atlantic, S. E. by Maranhão and Goyaz, S. by Matto Grosso, and W. by Amazonas; area, 460,000 sq. m.; pop. in 1871, 320,000. The coast, which is about 600 m. long in a straight line, comprises the most irregular portion of the Brazilian seaboard, being indented with numerous bays and inlets, the principal of which is the vast embouchure of the Amazon with its hundred islands, the most noteworthy of these being Marajó, Caviana, and Maxiana. The interior is described as a vast plain intersected by mighty rivers, and with but few hills, save in the N. E. and S. W. corners, those in the former region being the more elevated. The Almeirim hills on the left bank of the Amazon, some 200 m. from its mouth, are of singular formation, perfectly level on the top, and separated by wide openings with smooth sides. Their height is estimated at 1,800 ft. above the level of the river. Besides the Amazon, the more important rivers are the Tocantins, Araguay, Xingú, Tapajós, Trombetas, Oyapok, Araguary, Gurupí, Majú, Capim, Acara, Anapú, Pacajá, Anajás, Guamá, Pará, and Guajará. The climate is not generally unhealthy, especially in the *comarcas* or districts of Bragança and Cametá. On the Amazon rain falls almost every afternoon. The soil is fertile, and the vegetation the richest and most varied in the world. The primeval forests present inexhaustible supplies of timber and precious woods, including the various species of *jacarandá* or rosewood, the *itaúba* or stonewood, *pão ferro* or ironwood, 300 or 400 kinds of palms and medicinal trees, dyewoods, &c. (See BRAZIL.) The chief cultivated products are rice, cotton, the sugar cane, coffee, and some vegetables; and the export staples are caoutchouc in prodigious quantities, cacao, Maranhão chestnuts, rice, sugar, honey, hides, tapioca, with *urucú* (said to be superior to Brazil wood as a dye), sarsaparilla, balsam copaiba, and many other drugs, isinglass, &c. Cattle are largely reared. Besides the ocean steamers visiting Belem, there are about 12 lines of steamers plying between that city and the more important towns on the Amazon and its tributary streams. There are about 250 primary and 13 grammar schools in the province. Pará is divided into nine districts: Pará, Cametá, Marajó, Bragança, Gurupá, Macapá, Santarem, Breves, and Obidos. Capital, Belem or Pará. (See BELEM.)

PARÁ, Rio. See AMAZON.

PARACELSUS (PHILIPPUS AUREOLUS THEOPHRASTUS BOMBASTUS VON HOHENHEIM), a Swiss alchemist, born at Einsiedeln, Schwytz, in 1493, died in Salzburg, Sept. 23, 1541. He was the son of a physician, from whom he learned something of medicine, alchemy, and astrology, and made himself proficient in the arts of conjuring and juggling. He travelled on foot through the principal cities of Europe, visited Constantinople in the suite of a Tartar prince to learn from a Greek the secret of the elixir of Trismegistus, and, having become acquainted with some remedies not in common use among the faculty, returned to Switzerland, where he became celebrated for remarkable cures. In 1526 he was appointed professor of physic and surgery in the university of Basel. He proclaimed himself the sole monarch of physic, publicly burned the works of Galen and Avicenna, and professed to know the art of prolonging life and curing all diseases, and to hold more learning in the hairs of his beard than was possessed by all the universities and medical writers united. To the four elements of Aristotle he opposed the three compound principles of salt, sulphur, and mercury. The soul, according to him, was united to the body by an animal fluid. Man was an image of the Trinity, his intellect representing God, his body the world, and the fluid the stars. He recognized a mysterious harmony between the body and the earth and salt, between the soul and water and mercury, and between the intellect and the air and sulphur. His lectures were delivered sometimes in Latin, but generally in German, which made him popular and for a while attracted large audiences. Erasmus consulted him for the stone, and the correspondence between the quack and the philosopher has been preserved. In his personal habits as well as his language Paracelsus affected oddity. He slept in his clothes, and in later life became very intemperate. After the first year his lectures were deserted. About the end of 1527 he was compelled to leave Basel for abusing a magistrate, and after wandering through Germany for several years obtained a temporary success in Moravia. He next visited successively Vienna, Villach, Mindelheim, and Salzburg, where he closed his life in poverty. He published a few works, and left several which were printed posthumously. One of the latest editions of his writings is in Latin in 3 vols. fol. (Geneva, 1658).

PARADISE (Sans. *para-deça*, a foreign country; Heb. *pardes*, park; Arab. *firdaus*; Gr. παράδεισος), literally, a garden or pleasure ground planted with trees and flowers, whence the term is used metaphorically to express the abstract idea of perfect felicity and heavenly blessedness. In the Septuagint it is employed to express the Hebrew "garden of Eden." The nature and locality of the Biblical paradise have been discussed under EDEN. Metaphorically the word expresses the happiness of the righteous in a future state, an application adopted by the later Jews, and the general idea of which is to be found in the mythologies of various races. The mediæval rabbinical literature contains various fanciful descriptions of an earthly and a heavenly paradise, the latter being reserved for the final abode of the souls of the blessed. The celestial paradise is generally regarded as identical with heaven, or the place of future bliss according to the Christian dispensation; but Biblical critics have differed as to the signification to be given to the term in Luke xxiii. 43, where Christ says to the penitent thief, "To-day shalt thou be with me in paradise;" some considering the existence of a distinct abode for the reception of the blessed previous to the last judgment to be indicated, while others have found a stumbling block in the supposed doctrine of the Scriptures that between his death and resurrection the Saviour descended into hell. In the later history of the word it is to be observed that the *narthex* or *atrium* in which those who, on account of not being of the faithful in full communion, were assembled, was known as the paradise of the church; and Athanasius, speaking scornfully of Arianism, represents it as creeping into paradise, implying that it was befitting the low and ignorant. The paradise of the Mohammedans, termed in the Koran Gannah, or the happy gardens, is a place of infinite sensual delights conceived with all the warmth of oriental fancy, where devout followers of the prophet are received after death.

PARADISE, Bird of. See BIRD OF PARADISE.

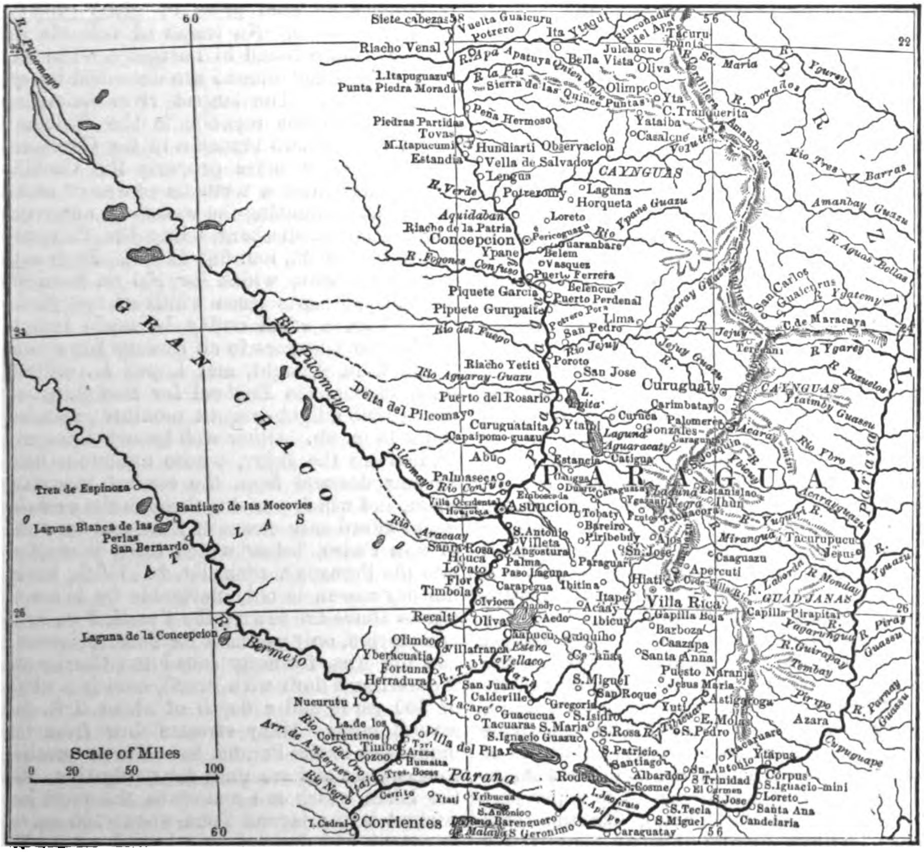
PARADOXURUS, a carnivorous mammal, allied to the ichneumons, inhabiting Asia and the neighboring southern islands. It has the habit of tightly coiling in a spiral manner its long tail, which however is not prehensile, whence the generic name given by Cuvier; the claws are retractile and cat-like, and the teeth like those of the civets. In the best known species, the luwack (*P. typus*), about the size of a cat, the general color is yellowish black, with three longitudinal rows of dark spots on each side of the back; it is plantigrade, and quick in its movements both on the ground and in trees;

it is nocturnal in habit, and preys upon small mammals and birds and eggs. The musang of Java (*P. musanga*) is an allied species, which does much mischief in the coffee plantations.

Luwack (Paradoxurus typus).

PARAFFINE (Lat. *parum affinis*, of weak affinity), a white, waxy substance, which was discovered in 1830 by Reichenbach among the products of the distillation of wood. It has since been produced by the distillation of many organic substances, such as resins, bituminous shales, peat, and boghead coal, and has been found ready formed in some varieties of petroleum, in the mineral ozokerite, in bitumen, and in earth wax. That paraffine existed in petroleum was noticed by Buckner in Bavarian oil as early as 1820; but as he did not pursue the inquiry to practical results, the credit of the discovery is assigned to Reichenbach, who ten years later fully described its properties and gave it its name. It was found in Rangoon petroleum in 1831, by Christison of Edinburgh, who had no knowledge of Reichenbach's discovery, and was named by him petroline. American petroleum contains very little, but the Rangoon and Java oil affords from 10 to 40 per cent.—Various methods are employed for the preparation of paraffine, depending upon whether it is a direct or an incidental product. Crude petroleum is distilled until 25 per cent. has gone over; the remaining portion is caught in tanks surrounded by ice or refrigerating mixtures, and the paraffine cake condensed by the cold. Enormous quantities of paraffine are made from ozokerite, which is a yellow vegetable wax, of fibrous structure and light specific gravity, found in Austria, Moldavia, the Caucasus, and near the Caspian sea. In its natural state it will melt readily, but it requires to be wrapped around a wick before it will burn. In the manufacture, 300 lbs. of ozokerite are subjected at a time to fractional distillation in an iron still, provided with coolers and condensers; the yield is 8 per cent. of oil and 60 per cent. of paraffine. The oil is reserved for illuminating purposes. A portion of the light oil, which boils below 212° F., is used in refining paraffine. The crude paraffine contains an oil which is removed under a hydraulic press and distilled to save adhering paraffine and for other purposes. The press cakes are melted and treated with sulphuric acid; the acid is neutralized with lime, and the paraffine distilled off. The product is again pressed, melted with the light oil mentioned above, and once more pressed. The final result is a perfectly white, transparent, hard substance, ready for the manufacture of candles. The manufacture of paraffine by the dry distillation of peat and boghead coal is divided into two operations: 1, the production of tar; 2, the working up of the tar for illuminating oil and paraffine. Before the discovery of petroleum in Pennsylvania, this industry was regarded as one of great importance. The illuminating oil was called kerosene, a trade name which has since been applied to refined petroleum. After the introduction of petroleum this industry declined in the United States, but in Scotland it is still extensively practised under the patent of Mr. Young. (See KEROSENE.)—Pure paraffine is a white, inodorous, tasteless substance, resembling spermaceti, harder than tallow, softer than wax, and having a specific gravity of 0·877. Its melting point depends somewhat on its origin, and ranges from 109° to 149° F. An ultimate analysis yields carbon 85 and hydrogen 15 per cent. It is insoluble in water, but readily soluble in warm alcohol, ether, oil of turpentine, olive oil, benzole, chloroform, and carbon disulphide. It is indifferent to the most powerful acids and alkalies, and can be distilled unchanged with strong oil of vitriol. It readily combines in all proportions with wax, stearine, palmitine, and resin. When required for candles, its melting point is raised by fusing it with stearine, wax, or spermaceti.—Besides the consumption of paraffine in the manufacture of candles, its application in the arts is extensive. Meat several times immersed in a bath of melted paraffine will keep for a long time; and when wanted it is only necessary to melt off the adhering film to prepare it for cooking. Further uses of paraffine are for stoppers to acid bottles, to coat paper for photographic uses, as a lubricator, as burning oil, to coat pills, to refine alcohol and spirits, for the preservation of timber, to preserve fruit, for oil baths of constant temperature, to prevent the oxidation of metals, to render fabrics water-proof, in the manufacture of matches, as a disinfecting agent, and as a varnish for leather. It is introduced into the sugar vacuum pans to prevent the frothing of the sirup. In some forms of the galvanic battery paraffine is introduced to prevent the evaporation of the liquid, and paraffine insulators are employed on telegraph lines. If paraffine be heated with sulphur, it is decomposed, and sulphuretted hydrogen is evolved. This reaction is now employed in the preparation of sulphuretted hydrogen gas for laboratory use. Heated for about 60 hours with nitro-sulphuric acid, paraffine yields a liquid called paraffinic acid, which has the specific gravity of 1·14, is insoluble in water, soluble in ether and alcohol, combines with alkalies, and burns with an illuminating flame. Chlorine gas decomposes paraffine, yielding hydrochloric acid. In medicine the preservative and protecting properties of paraffine are brought into frequent requisition; and in general, its chemically indifferent properties and permanent character render it one of the most useful products of industry.

PARAGUAY, a republic of South America, extending from lat. 21° 57′ to 27° 30′ S., and from lon. 54° 33′ to 58° 40′ W., bounded N. and N. E. by Brazil, S. E., S., and S. W. by the Argentine Republic, and N. W. by Bolivia; area (exclusive of the triangular section of the Gran Chaco lying mainly between the rivers Paraguay and Bermejo and the 22d parallel, one portion of which is claimed by Bolivia and the remainder by the Argentine Republic) variously estimated at from 57,000 (*Almanach de Gotha*, 1875) to 90,000 sq. m. The area was much larger before the war of 1865–'70, at the termination of which Paraguay ceded 1,329 sq. m. of its territory as a war indemnity to Brazil, the limits being fixed, by the terms of the treaty of March 26, 1872, as follows: "The bed of the Paraná river from the mouth of the Iguazú (lat. 25° 30′ S.) to the Salto Grande (lat. 24° 7′). From these falls the line runs (about due W.) along the highest divide of the Sierra de Maracayú to the termination of the latter; thence as nearly as possible in a straight line (northward) along the highest ground to the Sierra de Amambay, following the highest divide of that sierra to the principal source of the Apa, and along the bed of that river (westward) to its junction with the Paraguay. All the streams flowing N. and E. belong to Brazil, and those S. and W. to Paraguay." Paraguay was thus constrained to surrender the very portion of her territory so long claimed by Brazil, and the northern limit of which was the mouth of the Rio Blanco, 80 m. above that of the Apa. The computations of the population range from 100,000 to 1,300,000. A census ordered by Dr. Francia in 1840, and regarded as tolerably accurate, returned 220,000. The natural rate of increase till 1865 would have doubled this number (440,000); but in the subsequent five years' war the losses may fairly be estimated at half the population: 170,000 males by battle and disease (chiefly



the latter), and 50,000 women and children by famine and exposure in the forests. Thus the census returns of Jan. 1, 1873, were probably nearly correct, viz., 221,079. Of this number 28,746 were males and 106,254 females over 15 years of age, and 86,079 of both sexes under that age. The average proportion of male to female births is nearly as 8 to 9. The population is chiefly Indian (Guaranís and a few other tribes), the Guaraní being the dominant language throughout the republic. The few hundred white natives preserve their blood tolerably pure by intermarriage or by marriage with Europeans, and are for the most part gathered in or around Asuncion, the capital. Next to the Indians, the most numerous element is the mulatto or hybrid from the union of the early Spanish settlers and the Indian women, and further modified by Mamalucos from southern Brazil, and by the introduction of African slaves. The number of pure-blooded Africans is now inconsiderable. In 1873 there were 2,300 foreigners resident in Paraguay, including 2,000 Italians, 100 Germans, 100 English, and the remainder Austrians, Dutch, and Swiss.—The face of the country comprises two great valleys: one, on the west, from the Apa to the Paraná southward, forms a part of the basin of the Paraguay river; and the other, on the east, by far the smaller, extends from lat. 24° S. to the extreme S. E. limits of the republic. The Serra de São Jozé, approaching Paraguay from the north, constitutes, under the name of Cordillera de Amambay, the N. E. boundary with Brazil as far as lat. 24°; whence, taking successively the appellations of Cordillera de Urucuty, Caaguazú, and Villarica, the last (called Cuchilla Grande in its S. half) beginning W. of the town of the same name, it divides the country into two unequal portions. In lat. 24° an extensive branch known as the Cordillera de Maracayú is detached due E., and crossing the Paraná forms the magnificent cataract of Guayrá, the noise of which is said to be distinctly audible at a distance of 30 m. The greatest elevation, supposed nowhere to exceed 3,500 ft. above the sea, is attained in the lower extremity of the Cordillera de Amambay, and in the Maracayú and Caaguazú systems. The upper part of the Paraguay river basin, like the Gran Chaco territory on the opposite bank, is for the most part flat, save in the extreme north, where the serrated ridge of Quince Puntas traverses the plain, and sends down the waters of the Barriego and La Paz, and the diminutive southern tributaries of the Apa. In this region are comprised the celebrated *yerbales*, or maté fields. Low hills, thrown off rib-like from either side of the central chain, are separated by well watered and extremely fertile valleys, rich in primeval forests of valuable timber, and abounding in game. The southern portion of the republic is a vast expanse of swampy ground, closely resembling the alluvial detritus from the Andes which prevails in the pampas. The swamps are variously designated, according to their nature and extent, as *lagunas*, *cañadas*, *pantanos*, or *esteros*. The lagunas are genuine lakes or lakelets, with solid clay beds and replenished by floods; the cañados, tracts of deep adhesive mud and stagnant water; the pantanos, mere morasses with less water than the last; and the esteros, sluggish streams flowing through extensive swamps. These marshy regions, sometimes termed *carrizales*, are intersected at intervals by wave-like mounds of inconsiderable height, and are covered with compact jungles, interspersed with woody copses, shrubberies, *cañaverales* or patches of reed grass of giant growth, and palm groves. No traces of volcanic action have been found in Paraguay.—The rivers Paraguay and Paraná are described in separate articles. The largest river belonging exclusively to the republic is the Tibicuari, which rises by two branches in the Cordillera de Villarica, or more properly the Cuchilla Grande, and after a tortuous course of about 250 m., and collecting the waters of numerous minor streams, discharges into the Paraguay in lat. 26° 39′ S., lon. 58° 10′ W. Page says that this stream, which for 100 m. from its embouchure has a mean width of 300 yards, might with a small outlay be made navigable for many leagues in all seasons for steamers of 2 ft. draught, and Lopez II. ordered small steamers in England for that purpose; but in 1868 a light-draught monitor grounded about 15 m. up. Other well known Paraguay feeders are the Jejuy, whose numerous head streams descend from the central mountain chain, and which coursing through the *yerbales* might afford easy means of transport for maté to San Pedro, below which town it empties into the Paraguay, about lat. 24° 15′ S., but in the dry season is only navigable by boats or canoes above the town; the Ypané, 5 m. S. of Concepcion, only available for boat navigation; and the Apa, formerly called the Corrientes, the northern limit with Brazil, having a width of 300 yards and a depth of about 9 ft. for several miles. Many streams flow from the mountains to the Paraná, but all have precipitous courses and are unfit for navigation. Of the lakes, which are numerous, the most important is the laguna Ypuá, about 100 sq. m. in extent, and drained by a branch of the Tibicuari and another small river.—The mineral resources of Paraguay are but imperfectly known. Mr. Twite reports the occurrence of precious metals in several places, and a great abundance of iron. The iron of Caapucú and Quioquio yields from 30 to 36 per cent. of pure metal; and the iron works of Ibicuy, with upward of 100 operatives, were of great service to Lopez during the recent war. Copper has been found in several places. The scarcity of salt has frequently been sensibly felt in Paraguay, especially in 1865–'70, when the lack of it had so enfeebled the constitutions of the soldiers that their simplest wounds could not be healed. The climate is hot from November to February inclusive, when the mean temperature is 90° F. in the shade, but the maximum seldom higher than 100°; in the winter months, June, July, and August, the average temperature is 50°, the minimum being 40°. In the absence of sea breezes, the nearest point of the Atlantic from the centre of the state being 500 m. and of the Pacific 900 m. distant, the only modifying winds are those from the north and the south, the former having a relaxing tendency, and the latter being the precursor of rain and storms. Goitre is reported by Burton to be common at Asuncion, one case occurring in almost every family; but yellow fever and other epidemics are almost unknown in Paraguay, whose climate, particularly in the cultivated regions, has been pronounced one of the most salubrious in the world.—The soil is uniformly fertile, and every species of vegetation most luxuriant. A large portion of the country is covered with forests; and Du Graty enumerates upward of 50 distinct species of excellent building timber, some almost as hard as iron, as the *lapacho*, *quebracho* (axe-breaker), *urunday*, and *catigua*, and so heavy as to sink in water. The firm texture of the *morosimo*, *palo amarillo*, *tataiba*, *palo de rosa*, and many others, peculiarly adapts them to the purposes of the cabinet maker. The fruits of the *arahan* and *nangapare* are pleasant and nutritious. The Indians powder the fruit of the *algarroba* and preserve it in skins, and from its juice they make a favorite beverage. The *seringar* yields India rubber, and the *palo santo* gum guaiacum. One species of cactus furnishes the food of the cochineal insect. The bark of many trees is useful for tanning, and is an important article of export. From a parasite, the *guembe*, and from an aloe, the *caruguaty*, ropes and cables are extensively manufactured; and the *guembetaya* bears a fruit similar in appearance and taste to Indian corn, and used like the latter for bread by the natives. The caranday palm (*Copernicia cerifera*) affords an excellent roofing material, flinty, and impervious to moisture, and lasting 30 years. The varieties of the bamboo are numerous. The flora produces also many important medicinal drugs, as copaiba, rhubarb, sassafras, jalap, sarsaparilla, nux vomica, dragon's blood, and liquorice, and many dyestuffs. *Flechilla* or arrow-cane grass, very common along the banks of the rivers, affords a seed somewhat like oats, said to be as good as lucerne for fattening cattle. The *yerbales*, covering about 3,000,000 acres far in the interior, were for many years worked by the Indians under the Jesuits, through whom the *yerba maté*, or Paraguay tea, became known in most parts of South America as a substitute for tea and coffee. Of late years the consumption of maté has much diminished in Buenos Ayres, where it now brings 25 cents a pound. The quantity shipped in the time of Lopez never exceeded 4,468,425 lbs. per annum, worth about $800,000. The exports for 1870 were reported at 4,500,000 lbs., valued at $1,450,000; but these figures are considered exaggerated. (See MATÉ.) Several varieties of parasitic orchids, and the *mais del agua*, somewhat resembling the magnificent *Victoria regia*, are among the most remarkable of the flowering plants. In prosperous times, before the war of 1865-'70, there were few landed proprietors, three fourths of the cleared country having been confiscated by the government from the Jesuits at the time of their expulsion, and rented at nominal rates to small cultivators, whose plantations of maize, mandioca, cotton, and tobacco were to be met at intervals along the principal highways. In 1870 a survey of the republic was made, with the following results:

Public lands.	Arable	42,600 sq. m.
	Mountain and forest	27,000 " "
	Yerbales	5,040 " "
Total		74,640 sq. m.
Private lands		15,360 " "
Total		90,000 sq. m.

Agriculture is still zealously carried on; but owing to the insufficiency of laborers, not more than half of the most fertile districts are under cultivation. The chief agricultural products are maize, a sure and abundant crop, often yielding 150 fold, and mandioca, of which there are extensive farms. Rice is grown for home consumption, and frequently yields 250 fold. Tobacco, of which three crops are obtained annually, is largely cultivated both for export and for home consumption, the latter having been estimated at 15,000,000 lbs. per annum, and the exports at 6,000,000. In the trade returns for 1870 the tobacco exported figured at 3,500,000 lbs., valued at $750,000. Smoking is universal in Paraguay, by both sexes at all ages. Cigars, called *peti-hobi* and *peti-pará*, are manufactured on a large scale at Villarica and Asuncion, for the Buenos Ayres market. Paraguay tobacco obtained a gold medal at the Paris exhibition in 1855. The sugar cane thrives well, but for want of suitable machinery the crop is comparatively limited; a liquor called *caña* and considerable quantities of molasses are made from it. According to official reports, there were 550,000 acres of land under cultivation in 1863, as follows: with maize, 240,000; mandioca, 110,000; beans, 75,000; cotton, 32,000; tobacco, 23,000; sugar cane, 25,000; *maui* (peanuts), 11,000; and rice, vegetables, &c., 34,000. Of cotton, 4,000 bales were produced in 1863. Wool, fruits, honey, and indigo and other dyes could be supplied in prodigious quantities, if there were adequate means of transport. Among the rich dyes are the *iriburetuia* or "vulture's leg," which gives a blue metallic tint, and the *acuagay* root, a bright scarlet. There are large herds of cattle, estimated at 300,000 head in the year preceding the war; the horses are generally inferior to those of the Argentine Republic; and there are some sheep and other European farm stock. The *felidæ* are the same as those of Brazil, comprising the jaguar, here called *onza*, puma, and ocelot. The peccary, tapir, aguara, ant-eater, and capybara (whose skin is fashioned into *tiradores* or belts used in lassoing) are found. There are four species of deer: the *guazú pucú* or *cervus paludosus*, *guazú pita* or *C. rufus*, *guazú mini* or small stag, and *guazú bira*, usually found in the forests. Other wild animals are, several varieties of armadillo, some of which are hunted for their flesh, the tatú, cavy, two kinds of otters, and howlers, red-furred bujas, the dwarfish ouistiti, and other monkeys. The rivers and lakes swarm with caimans, of which there are two species; several kinds of lizards are mentioned, some attaining a length of 8 ft.; the serpents include the boa and two or three venomous snakes, one being a species of rattlesnake, probably the hideous and deadly *trigonocephalus*. Common bats are numerous, as are also vampires, of which 13 varieties have been described by Azara; myriads of locusts appear from time to time, devastating whole districts; and clouds of mosquitoes, sand flies, and other noxious insects infest the marshes and river banks. A species of ant deposits nodules of wax upon the twigs of the *guayava blanca*, which are gathered and made into candles. The predatory birds are represented by vultures, hawks, and buzzards; the most remarkable of the waders is a kind of giant stork, *mycteria Americana;* there are two species of partridge, pheasants, wild ducks, a sort of bustard said to eat serpents like the Brazilian *siriema*, water hens, and scissor birds; and seven or eight varieties of parrots and paroquets. The *nandú* or American ostrich is common; songsters are numerous; and foremost among the birds admired for their brilliant plumage is the tiny *viudita* or little widow, robed in jet black and snow white. Almost all the rivers afford abundance of fish of delicate flavor, those most esteemed being the *pacú*, *dorado*, and *palometa*.—The manufactures are few; they consist chiefly of coarse cotton and woollen fabrics, utensils made of wood and hides, cigars, preparations of gums and resinous substances, distillation of liquors from the sugar cane and algarroba, molasses and sugar, and ropes and cordage. The implements of agriculture are rude and primitive. In the three years 1861–'3 there were constructed in the arsenal at Asuncion seven mail steamers to ply to Montevideo, besides cannon, stores, bells, &c. During the Lopez administration commerce was hampered in various ways, such as government monopolies and other abuses which rendered freedom of trade unknown in the republic; and the chief staples of export were purchased by the dictator's agents. Nevertheless, and in spite of the natural difficulties in the way of transporting merchandise to the sea from this landlocked state, the commerce of Paraguay had considerably increased during the decade following the downfall of Rosas, the Argentine dictator, and the consequent opening of the river traffic, as will be seen from the annexed table of imports and exports for three years of that period, compared with 1851:

YEARS.	Imports.	Exports.
1851	$173,188	$260,712
1855	328,891	754,425
1859	1,154,786	1,649,759
1860	664,331	1,270,423

The amounts are in dollars of the United States; the Paraguayan dollar is equivalent to 75 cents. The excess in the value of the exports over imports was employed in the construction of an arsenal, the purchase of railway materials and arms, and the education of youths in Europe. The list of the imports and exports for the year 1860, with their values, is as follows:

IMPORTS.		EXPORTS.	
ARTICLES.	Value.	ARTICLES.	Value.
Silks	$28,464	Yerba maté......	$820,395
Woollens	100,242	Tobacco	219,625
Linens and cott'ns	255,040	Dry hides.........	140,840
Hardware........	22,368	Tanned hides....	17,154
Wines and spirits	59,262	Bark for tanning.	16,856
Groceries.........	116,749	Oranges..........	17,599
Dry goods, boots and shoes, &c..	42,265	Timber...........	11,099
Sundries	44,972	Sundries..........	26,871
Total..........	$664,332	Total..........	$1,270,439

The custom house yielded in the same year $220,000, of which two thirds represented duties on imports at 20 per cent. *ad valorem*, and one third on exports at 5 per cent. Maté, which belonged to the government, paid no duty; but gold or silver coin, although introduced by travellers to defray their current expenses, was subject to a duty of 10 per cent. on leaving the republic. The total value of the imports for the year 1873 was $750,000, and of the exports $710,500, showing an excess of imports, contrary to the state of things before the late war. Sugar was imported to the amount of $54,000. The value of the maté, cigars, and hides sent out of the country in 1873 was $459,750, $99,750, and $99,750 respectively, showing a diminution of from 64 to more than 100 per cent. since 1860.—Under Lopez I. there were comparatively good roads leading from the capital to some of the more important agricultural districts, a carriage road from Villarica to the Paraná was begun, and the railway intended to connect Asuncion and Villarica, and in operation to Paraguary, a distance of 45 m., was begun in 1858. There is no bank or other institution of credit in the republic. In 1863 the national revenue amounted to $4,275,000; in 1873 it did not exceed $412,500, the chief sources being duties on imports ($348,000), exports

($70,500), rents of state property, licenses, &c. The estimated expenditures for 1874 were $841,805. Previous to 1865 Paraguay had no national debt, but a large surplus income; but she is now almost hopelessly bankrupt, being indebted, by virtue of stipulations arising out of the late disastrous war, in the sum of $150,000,000 to Brazil, $26,250,000 to the Argentine Republic, and $750,000 to Uruguay, a total of $177,000,000; besides $14,518,500, principal and interest of a loan contracted in England in 1871. There is also a large home debt, the amount of which has not been reported.—In 1861 Paraguay had as many public primary schools in proportion to her population as the most advanced Spanish American states; instruction was made compulsory and gratuitous, and the justices of the peace were ordered to aid in carrying out that measure; but the instruction was not made secular, and the result was unsatisfactory. Grammar schools were few; of higher instruction there was very little, and that confined to a single establishment at the capital. Since 1870, however, well directed and determined efforts have been adopted for the extension of primary instruction, and in the budget for 1874 figured an appropriation of $34,860 for schools. Books were meagrely supplied and mostly limited to religious subjects. The total value of the books imported in the ten years immediately preceding the war was but $3,299. Lopez had four newspapers, all edited under his supervision. The Roman Catholic is the religion of the state, but all others are tolerated. —By the terms of the new constitution of Nov. 25, 1870, mainly based upon that of the Argentine Republic, the legislative authority is vested in a congress composed of a senate and a chamber of deputies; and the executive in a president elected for a term of six years, with a non-active vice president, and a cabinet of five ministers, viz., of the interior, foreign affairs, finance, public worship and public instruction, and war and the navy. The present strength of the army is about 2,000 men, comprised in two battalions, two regiments of cavalry, and a regiment of artillery. The estimated expenditure of the war department for 1874 was put down at $98,918.—Paraguay was discovered in 1530 by Sebastian Cabot; and the first Spanish colony was established under the auspices and direction of Pedro de Mendoza, whose lieutenant, Juan de Ayolas, founded Asuncion on Aug. 15, 1536 or 1537. The town was erected into a bishopric in 1555. The country called Paraguay, which at first comprised the entire basin of the Plata, was governed till 1620 by adelantados subject to the viceroyalty of Peru; but in that year two distinct governments, Paraguay and Buenos Ayres, were formed by royal decree, administered by intendants likewise under the jurisdiction of Peru. This state of things continued till 1776, when the two provinces were again united under the separate viceroyalty of Buenos Ayres. The Spaniards on their first arrival found the country in the possession of Guaraní tribes, an intelligent and industrious people, readily amenable to the civilization of the new settlers. The first missionaries, Field and Ortega, reached Paraguay in 1557, and met with astonishing success in winning the confidence of the natives. They were soon followed by others; missions were established between the rivers Uruguay and Paraná, extending across the latter river to within the present limits of Paraguay; the disciples were collected by thousands into villages, where splendid churches were built; and finally, by a mandate which the Jesuits obtained about 1690, forbidding all other Spaniards to enter their territory without their permission, they were enabled to establish an almost independent theocratic government. Before the middle of the 17th century 30 missions had been founded; and in 1740 the number of civilized Indians was ascertained to be upward of 140,000. Each mission was built in a uniform style, with a great *plaza* in the centre, and here were erected the church, college, arsenal, stores, and workshops of carpenters, smiths, and weavers, all under the immediate care of the priests. Once a week the male inhabitants went through military drill, prizes being given to the best marksmen. Church ceremonies were performed every day, the children beginning with morning prayer, followed at sunrise by mass, at which the whole population attended. Baptisms took place in the afternoon; vespers were sung every evening; and holidays or festivals were chosen for the celebration of marriages. The Indians were excellent musicians and singers. The dress of both sexes was of native cotton cloth, the men wearing shirts and short trousers, the women caps and loose gowns. The schools and workshops were admirably managed, and the wood carving of the artisans still elicits admiration. The Spanish language was prohibited, and from the printing offices established at Santa Maria and San Javier in the 17th and 18th centuries were issued many works in Guaraní, the following being still extant: "Temporal and Eternal," by P. Meremberg (1705); "Jesuits' Manual for Paraguay" (1724); "Guaraní Dictionary" (1724); "Guaraní Catechism" (1724); and "Sermons and Examples," by Tapaguay (probably a native Jesuit). In 1767 the Spanish government decreed the expulsion of the priests, who offered not the least resistance. In 1801 Soria estimated the survivors of the 30 missions at somewhat less than 44,000, two thirds of their population having disappeared in the space of 34 years. As early as 1628 descents were made upon the missions from São Paulo in Brazil, and according to Page 60,000 of the Indians were carried off in that and the two following years, and sold as slaves in the market of Rio de Janeiro. After the expulsion of the Jesuits the converts were soon dispersed; many took to the woods; the plantations were abandoned; the cattle, sheep, and horses were destroyed; and of the stately edifices only a few crumbling ruins now remain. In 1776, as has been said, Paraguay was incorporated with Buenos Ayres in a viceroyalty, with that city as the capital. After the destruction of the home government by the French, a provisional government was established at Buenos Ayres in 1809, which still acknowledged the sovereignty of Spain. The Paraguayans in 1811 took steps to secure their own independence, and defeated an army under Gen. Belgrano, sent by the authorities of Buenos Ayres to coerce them into submission. After Belgrano's expedition, the country was governed for a time by a *junta* composed of Generals Pedro Juan Caballero, Fulgencio Yegros, and Dr. José Gaspar Rodriguez de Francia. The junta was soon changed (1813) into a duumvirate, Caballero having been excluded, and Yegros and Francia receiving the title of consul. Two curule chairs were placed in the assembly, one bearing the inscription "Cæsar," occupied by Francia, and the other that of "Pompey" for his colleague. In 1814 the government was again changed, Francia securing his nomination as dictator, at first for three years, and afterward for life. Henceforth, until his death on Sept. 20, 1840, he was the absolute ruler of Paraguay. He followed the example set by the Jesuits, and prohibited the entrance or exit of foreigners. His rule was rigorous and often cruel, but he introduced many reforms, established schools, and devised a code of laws. During a brief interim the country was governed by a *junta gubernativa*, successively presided over by Dr. C. L. Ortiz and Gen. Juan José Medina. On March 12, 1841, the consular system was reëstablished, and Don Carlos Antonio Lopez and Don Mariano Roque Alonso were named consuls. In 1844 the title of the executive was again changed, and Lopez was made dictator for ten years; at the expiration of his term he was reëlected for three years, and again in 1857 for seven years. His domestic government seems to have been as strong as Francia's, but he was more liberal to foreigners, and surrendered the control of church matters into the hands of the priesthood. The independence of Paraguay was not formally acknowledged by the other states of La Plata until Urquiza came into power in the Argentine confederation, and made a treaty with Lopez, July 14, 1852. It was recognized by Great Britain in January, 1853. In the same year the United States government sent the steamer Water Witch, under Commander T. J. Page, to survey the river La Plata and its tributaries. Capt. Page was well received by President Lopez, and his mission was successfully carried on until February, 1855, when the Water Witch, in the peaceful prosecution of her voyage up the Paraná, was fired upon by the Paraguayan fort Itapirú, and one man killed. The fire was returned, but as the steamer was of small force and not designed for offensive operations, she soon retired from the conflict, and Capt. Page hastened to communicate the events to his government. Preparations were made at once to demand reparation, and a considerable fleet was sent to the Plata. A commissioner appointed to accompany the fleet opened negotiations with President Lopez, and by the mediation of Urquiza an arrangement was concluded by which Paraguay agreed to make compensation. Capt. Page resumed his surveys, and completed them in December, 1860. In 1858, by a convention with Brazil, the waters of the Paraguay were declared to be open to the mercantile marine of all friendly nations. The efforts to establish a systematic and direct trade with Paraguay have not as yet been very successful. In 1853 an American company went out, but were forced to return the following year. A French settlement was established in 1855, but meeting with no encouragement from the Paraguayan president, the colonists abandoned it the same year. Lopez died on Sept. 10, 1862, and was succeeded by his son Francisco Solano, commonly known as Marshal Lopez, under whose administration the government, though still nominally republican, was as despotic and absolute as in the days of Francia. Nevertheless, great progress was made; and had Lopez not been blinded by ambition, the country would have rapidly risen to importance. But, not satisfied with the title of marshal, he aimed at an imperial crown and at foreign conquest. His measures for the latter were chiefly directed against Brazil, and the desired opportunity for hostilities offered in 1864. The Brazilian government, having claims to urge against Uruguay for damages to Brazilian citizens resident in that republic, seized the opportunity to do so when Montevideo was besieged by revolutionary troops under Gen. Venancio Flores, chief of the *colorados* or liberal party, and late unsuccessful candidate for the presidency, against N. Aguirre of the *blanco* party. In spite of the repeated protests of Lopez, Brazil openly gave aid to Flores. Lopez, who had recruited a powerful army and erected fortifications along the river bank, on Nov. 11, 1864, captured a Brazilian steamer on its passage upward to Matto Grosso, detaining the passengers and crew as prisoners of war. This offensive step was followed in December by the invasion of Matto Grosso by a Paraguayan army, which sacked Cuyabá, the capital, and other towns, and seized the diamond mines of that province. Meantime Lopez had promised aid to Aguirre, but President Mitre of the Argentine Republic refused permission of transit for Paraguayan troops across the province of Corrientes. Flores, however, had been victorious, and entered upon the presidential functions early in 1865. Lopez, now fearing that the Argentines would take sides against him, captured two of their war vessels in the bay of Corrientes, April 13, 1865, invested the town of the same name next day, formed a provisional government composed of Argentine citizens, and declared the provinces of Corrientes and Entre Rios to be annexed to the republic of Paraguay. On the 18th a mutual declaration of war was made by the two republics; and on May 1 an offensive and defensive alliance was secretly entered into by the Argentine Republic, Brazil, and Uruguay, these powers "solemnly binding themselves not to lay down arms until the existing government of Paraguay should be overthrown, nor to treat with Lopez, unless by common consent; providing for the guarantee of Paraguayan independence; fixing on that republic the responsibility for the expenses of the war; and agreeing that no arms or elements of war should be left to it." The sudden aggressions upon Brazil and the Argentine Republic, for which neither of those countries was prepared, and which led to the declaration of war, might easily have been followed by triumphs far above the expectations of Lopez, had his energy equalled his ambition; for he had at his command a well disciplined army 80,000 strong. In June hostilities began; the Paraguayan fleet was defeated on the 11th by the Brazilians on the Paraná; and the Paraguayan troops were compelled to evacuate the Argentine territory on Nov. 3, the town of Uruguayana on the Uruguay having in the mean time surrendered to the allies. During the remainder of 1865, and in the course of 1866 and 1867, numerous battles occurred both by land and on the river Paraguay, with varying success, and with considerable loss to the allied ranks; but the Paraguayan troops, who suffered equally in the field, were also considerably reduced by disease and privations. Thus, in spite of the undoubted courage of his soldiers, Lopez lost in quick succession his principal strongholds, and his capital was occupied by the invaders on Feb. 21, 1868. In June Humaitá, his best fortress, commanding the junction of the rivers Paraguay and Paraná, was bombarded and demolished. From that time Lopez, who had taken refuge in the mountain fastnesses of the interior, vainly persisted in a struggle which terminated only when he fell at Aquidaban on March 1, 1870. A provisional treaty, drawn up at Asuncion on June 20, declared peace to be restored between the belligerents, and the rivers Paraguay and Paraná to be reopened to the merchant and military navies of the allies, free of all obstacles. A new constitution was adopted, and promulgated on Nov. 25, providing for the free exercise of all religions, the encouragement of immigration and protection of immigrants, and the summary punishment of such persons as should in future attempt to assume the dictatorship. A provisional government, with C. A. Rivarola as president, was superseded in December, 1871, by Salvador Jovellanos, in the course of the first year of whose administration the peace was disturbed by three revolutions, the government being shut up in Asuncion by the insurgents. In April, 1874, aided by the Brazilian troops, which still occupy Paraguay, the government was enabled to suppress the rebel movements; but the country is virtually under a Brazilian protectorate. In October, 1874, Jovellanos was succeeded by Juan Bautista Gill.—See *Essai sur l'histoire naturelle des quadrupèdes du Paraguay*, by Félix de Azara (Paris, 1801); "La Plata, the Argentine Confederation, and Paraguay," by Thomas J. Page (New York, 1859); *Histoire physique, économique et politique du Paraguay et des établissements des Jésuites*, by Dr. Alfred Demersay (Paris, 1860–'65); "The War in Paraguay," by George Thompson (London, 1869); "La Plata, Brazil, and Paraguay," by A. J. Kennedy (London, 1869); "Seven eventful Years in Paraguay," by G. F. Masterman (London, 1869); "Letters from the Battle Fields of Paraguay," by Capt. R. F. Burton (London, 1870); and "History of Paraguay," by Charles A. Washburn (Boston, 1871).

PARAGUAY, a river of South America, whose head waters descend from one of the seven lakes on the low swelling plateau commonly called the Serra Diamantina, in the Brazilian province of Matto Grosso, 160 m. N. of the city of Cuyabá, lat. 13° 20′ S., lon. 55° 50′ W. The uppermost branch is the Rio Diamantino, and next are the Preto or Negro, the Sipotuba, and other smaller streams from the west, before the confluence of the Jaurú, which doubles the volume of the Paraguay, in lat. 16° 28′. About 120 m. further S. it collects from the east the waters of the navigable river São Lourenço, a branch of which passes Cuyabá. Here the Paraguay has a width of 600 yards, which it retains, with a mean depth of 15 ft., to Asuncion, the capital of the republic of Paraguay. Below the junction of the São Lourenço it traverses the marshy region of Xareyes or Xarayes, draining the lakes of Oberava, Gahiba, and Mandioré, and receiving the large river Taquary, the Rio Blanco (formerly claimed by Paraguay as the northern boundary with Brazil), the Apa or Corrientes, the Ypané, and the San Pedro from the east, and several from the west. In the remaining 150 m. of its course, from Asuncion to its junction with the Paraná from the east at Tres Bocas, lat. 27° 13′, it receives its most important affluents, the Pilcomayo and the Bermejo, both from Bolivia. At Tres Bocas the main stream, after a course of over 1,000 m., exclusive of its numerous sinuosities, takes the name of the affluent; for such the Paraná evidently is, inasmuch as the direction and all the geological characteristics of the river, down to the confluence of the Uruguay, are those of the Paraguay. From Asuncion to Tres Bocas the general width is half a mile, though in some parts it narrows to a quarter of a mile; the minimum average depth being 20 ft., and the maximum depth 72 ft. The ordinary velocity of the current is 2 m. an hour. Vessels drawing 16 ft. can generally ascend the Paraguay to the Brazilian town of Corumbá, lat. 18° 55′, and river steamers in all seasons to the junction of the São Lourenço. The Paraguay and the Amazon feeders Xingú and Tapajós take their rise within a few miles of one another, and the watershed is so low that wooden canoes ascending the Tapajós from Santarem are constantly carried over, and descend to Villa Maria; so that, with but little labor, almost uninterrupted navigation by steamers could be secured through the heart of the continent, from the mouth of the Plata to that of the Amazon. Up to Asuncion the navigation is easier than on the Paraná; the waters are confined within narrower limits, the depth of the channel is more uniform, and no obstruction is to be apprehended. The periodical rise of the river usually averages 13 ft., and occurs in January, February, and March, and in July, August, and September, thus almost corresponding to the periods of the fall in the Paraná; hence the volume of the stream resulting from the union of the two rivers is nearly always the same. The banks of the Paraguay are generally sloping, and rarely exceed 25 ft. above the average height of the stream. They are clothed on both sides with a magnificent vegetation; forests with innumerable varieties of precious timber and ornamental woods alternating with palm groves and extensive grassy plains. The portion of the river comprised within the tropics abounds in *jacarés* (caimans) and in excellent fish. Brazilian mail steamers ply monthly between Montevideo and Cuyabá, a distance of 2,000 m., making the trip in from 10 to 12 days; and there are several lines of steamers between Buenos Ayres and Asuncion.—The Paraguay forms a portion of the dividing line between Brazil and Bolivia, and the entire boundary of Paraguay with Bolivia and with the Argentine Republic on the west. It was made free to ships of all nations in 1852, and has remained so to the present time (1875), except during the Paraguayan war of 1865-'70.

PARAGUAY TEA. See MATÉ.

PARAHYBA. I. A N. E. province of Brazil, bounded N. by Rio Grande do Norte, E. by the Atlantic, S. by Pernambuco, and W. by Ceará; area, 31,500 sq. m.; pop. in 1871 (estimated), 280,000. The coast is low, but inland the surface is traversed by several mountain ranges, the principal of which are the serras de Borborema and de Teixara. In the former rises the Rio Parahyba do Norte, which empties into the Atlantic after an E. N. E. course of 300 m. The Mamanguape, emptying 18 m. further N., is the only other considerable river. The climate inland is hot, but is considered healthful. Much of the country is fit only for pasturage, and many cattle are raised. The fertile tracts are partly covered with dense forests and partly cultivated. Cotton, sugar, and tobacco are raised to some extent. During the decade ending in 1873, the yearly average export of cotton was 196,568 lbs.; of sugar, 185,744 lbs. Gums, resin, and timber are largely exported. In 1865 an English company was organized to work the gold mines in the interior. In 1873 there were in the province 126 primary and grammar schools, of which 33 were for females with an aggregate attendance of 991, and 93 for males with 2,695 pupils; and there is a lyceum in Parahyba, and colleges in Mamanguape, Area, and Pombal. II. A city, capital of the province, on the right bank of the river Parahyba do Norte, 10 m. from the sea, and 65 m. N. of Pernambuco; pop. about 14,000. It is divided into an old and a new town, and has good streets and well built houses. The climate is salubrious. The port is good, but vessels of more than 350 tons seldom go up to the town. There is a large coasting trade, and the steamers of nearly all the Brazilian lines stop here on the trips between Rio de Janeiro and Belem. The principal exports are cotton, sugar, fish, hides, rum, tafia, coffee, and cacao. A railway to extend 60 m. inland was to be begun in 1875.

PARALLAX, the apparent displacement of a heavenly body arising from a change of the observer's position. The angle subtended at the body by the line joining the two stations is the measure of the parallax. As the positions of the heavenly bodies have reference in practical astronomy to the earth's centre, a correction for parallax is necessary in every observation, except when the body is in the zenith, where the parallax vanishes. It is greatest in the horizon, and is there termed horizontal parallax. It is manifestly equal to the angle subtended by the earth's radius as supposed to be seen from the body, as the earth's radius varies with the latitude, and the equatorial radius is commonly selected as the measure of parallax. By the mean horizontal equatorial parallax of the moon, for instance, is understood the angle subtended by the earth's equatorial semi-diameter at the moon's mean distance. The same is the case with the sun. And even if the word equatorial be omitted, it is to be understood that equatorial parallax is signified unless the contrary be implied. The parallax and the sine of the parallax are appreciably equal for all objects except the moon, and either is used indifferently. In the case of the moon there is a difference, and unfortunately two usages are employed. Where the mean equatorial horizontal lunar parallax is spoken of, the word parallax is used in its usual sense; but what is called the lunar constant of parallax is in reality the angle which has for its circular measure the sine of the true parallax.—Annual parallax is the variation of a star's place by being observed from opposite points of the earth's orbit. This is extremely minute, notwithstanding the great length of the base line, and is so difficult of determination that it long defied the endeavors of astronomers to detect it. (See ASTRONOMY.) The apparent absence of stellar parallax was considered by Tycho Brahe fatal to the Copernican doctrine of the earth's orbital motion. Galileo suggested a mode of investigating the problem by observations on two stars of different magnitudes situated close together. This mode has been successfully applied by modern observers. Hooke was the first to use the telescope in this investigation, but he failed. The aberration of light had not then been discovered, and the result he announced as parallax was probably due to this cause. The same is to be said of Flamsteed. The attempts of astronomers to determine parallax led to two signal discoveries, the aberration of light by Bradley (1725), and the systems of double stars by the elder Herschel (1803.) The earliest approximately successful researches on this problem were made by the elder Struve, begun in 1835 on the star α Lyræ, though his conclusions were not received with entire confidence by astronomers. The first unequivocal success was reached shortly afterward by Bessel at Königsberg on the star 61 Cygni, and by Henderson at the Cape of Good Hope on the star α Centauri.

PARALYSIS, or **Palsy** (Gr. παράλυσις, relaxation), a loss of the power of motion in any part of the body. As the contractile power of the muscles depends upon their healthy organization and the integrity of their structure, anything which interferes with these qualities will diminish in a corresponding degree their power of action. Imperfect nutrition or atrophy of the muscles, their disuse, a fatty degeneration of their texture, and the action of certain poisons (see LEAD), will all have this effect and destroy the power of motion by directly affecting the muscular fibres themselves. A paralysis of this kind is called "muscular paralysis," since its cause resides in the substance of the muscular tissue, which has lost its natural properties.—Paralysis, however, is oftener due to injury or disease of the nerves or nervous centres. As muscular contraction is naturally excited during life by a stimulus communicated to the muscles through the nerves, when this communication is cut off by injury or disease of the nervous fibres, the natural movements in the corresponding region of the body are at once suspended. This is most distinctly marked in paralysis of those parts which are the seat of the voluntary motion, that is, the limbs and trunk. If the nerves going to the right arm be divided or contused, or constricted by a ligature, voluntary motion is at once lost in the corresponding limb. The muscles themselves are uninjured, and are as capable of contraction as ever; but they cannot be called into action by any effort of the will, because the natural stimulus, which should be conveyed to them through the nerves from the brain, is cut off by the injury of the nervous trunks. A similar effect will be produced if the fibres of the brain itself be injured at the point where these nerves take their origin.—There are various forms of paralysis, corresponding to the different regions of the body affected and the extent of the affected portion. The following are the most important. 1. Hemiplegia, or paralysis of one lateral half of the body, that is, of the right arm and right leg, or the left arm and left leg, with the corresponding portions of the trunk. This is due to a circumscribed apoplexy or other injury which affects one side of the brain, and which, owing to the crossing of the fibres in the medulla oblongata, produces paralysis of the opposite side of the body. 2. Paraplegia, or paralysis of the two lower extremities with the lower part of the trunk. This results from an injury to the spinal cord about its middle portion, which of course paralyzes all the parts below the seat of the injury, while those above, still preserving their connection with the brain, continue to have the power of voluntary motion. 3. Facial paralysis, or that affecting the superficial muscles of one lateral half of the face, so that the natural expression is lost in this region, and the features on the affected side are relaxed and vacant. This is owing to an injury of the seventh or facial nerve at some point in its passage from its origin in the brain to its termination in the muscles. 4. Local paralysis of any other part of the body, due to injury or disease of the special nerve distributed to that part.—Another important distinction in regard to paralysis is whether it is accompanied with loss of sensibility of the part, as well as loss of motion. As these two properties are conferred by two different sets of nervous fibres, and as these fibres may be injured separately or together, we may have paralysis of motion without loss of sensibility; loss of sensibility without loss of motion; or, finally, a paralysis of both at the same time. The degree in which the power of motion and sensibility are affected in relation to each other, in any particular case of paralysis, will often throw much light on the precise seat of the injury or disease in the nervous system. (See BRAIN, DISEASES OF THE, and SPINAL DISEASES.)

PARAMARIBO, a maritime city, capital of Dutch Guiana, on the left bank of the Surinam, 20 m. from the sea; lat. 5° 50′ N., lon. 55° 13′ W.; pop. about 18,000, half of whom are blacks. Three canals traverse the town; the streets are regularly laid out and well kept; and the houses, many of which are of wood, are surrounded by gardens. The bank of Surinam, situated here, with a capital of $400,000, is the only one in the colony. The port is safe, commodious, and well frequented. Paramaribo is the centre of the Dutch West India commerce. Its principal exports are sugar, molasses, and rum (all to Holland), coffee, cotton, and indigo, with cacao, fancy woods, and timber. Manufactured goods, machinery, provisions, ginger, drugs, wines, &c., are extensively imported. The total value of the exports for the year ending Sept. 30, 1873, was $1,244,115, and of the imports, $1,452,330. The entrances for the same year were 86 steamers, tonnage 15,900, and 107 sailing vessels, tonnage 20,939; clearances nearly the same.

PARAMATTA, a town of Australia, in New South Wales, on the Paramatta river (an arm of the sea), 14 m. N. W. of Sydney; pop. in 1871, 6,103. Among the notable public buildings are the government house, the benevolent asylum, the schools, the court house and town hall, several places of worship, among which the new Gothic Congregational church is prominent, and a school of arts. Its observatory has been transferred to Sydney. There are two orphan schools and two lunatic asylums, two woollen factories, and two flour mills. The walks are planted with oaks, the largest in Australia. The vicinity is famous for its orangeries and orchards. Paramatta is next to Sydney the oldest town in the colony, and has been under municipal government since 1861.

PARANÁ, a river of South America, formed by the union of the Paranahyba and Grande, both from the mountains of Minas Geraes in Brazil. From the point of junction of these rivers, about lat. 20° S., lon. 52° W., the Paraná flows S. W. by S. as a majestic stream to lat. 24° 4′, where it forms the cataract of Guayrá or Salto Grande, described by travellers as eclipsing in magnificence all others in the world, not even excepting Niagara. After collecting the waters of several rivers on both banks, and especially those of the Tieté and Paranapanema from the east, the Paraná increases in width until it attains nearly 4,500 yards a short distance above the falls; then the immense mass of water is suddenly confined within a gorge of 200 ft., through which it dashes with fury to the ledge, whence it is precipitated to a depth of 56 ft. It is computed that the volume of water per minute is equal to 1,000,000 tons; the velocity of the flood through the gorge is 40 m. an hour, and the roar of the cataract is distinctly audible at a distance of 30 m. The river continues in a southerly direction for nearly 200 m., forming the boundary between Brazil and the Argentine Republic on the E. and Paraguay on the W., and then turns S. W. and afterward W., flowing between Paraguay and the Argentine Republic, till it is joined by the Paraguay at Tres Bocas, a little above Corrientes, 900 m. above its mouth. Thence it pursues a S. course through the Argentine Republic to Santa Fé, where it separates, forming several islands, and flows S. E. till it unites with the Uruguay to form the Rio de la Plata, after a course of 1,860 m., exclusive of that of the Paranahyba and Grande. Its principal tributary is the Paraguay (which is more voluminous, though shorter and narrower, than the stream in which its name is lost), and between their point of junction and Salto Grande empties the Iguazú. The Paraná is full of islands, which undergo a constant round of decay and renovation. Within the past century many have disappeared, and others have been formed and protected by vegetation. They are all well wooded, as are also the adjacent shores; but being composed of mud and sand, without even a pebble, and extremely low, they are inundated during the periodical rises of the river. The Paraná is in general more picturesque than the Paraguay, especially in the lower half of its course, where the cliffs are sometimes absolutely perpendicular, and of a reddish tinge, and at other times presented in large broken masses, clothed with cacti and mimosa trees. Several lines of steamers regularly ply between Buenos Ayres and Rosario and Corrientes. It is navigable to Corrientes for vessels drawing 16 ft., for smaller craft to Candelaria, and thence only for small boats up to the cataract.

PARANÁ, a S. E. province of Brazil, bounded N. by Matto Grosso and São Paulo, E. by the Atlantic and Santa Catharina, S. by the latter province and that of São Pedro or Rio Grande do Sul, and W. by Paraguay and Matto Grosso; area, 72,000 sq. m.; pop. in 1871, 90,000. The coasts are generally low, the country rising inward more or less abruptly to the plateau. The surface in the latter region, which forms part of the Brazilian highland, is generally undulating; but there are no elevated summits. The principal rivers are the Paranapanema in the north, the Uruguay along the southern boundary, and the Paraná in the west; the interior is drained by the Tibagy, an affluent of the Paranapanema, and the Ivahy and Iguazú, tributaries of the Paraná. All these rivers are navigable by canoes. Little is known of the geology of Paraná. Coal is supposed to exist on the coast; mercury has been found near Paranaguá, and gold and diamonds on the banks of the Tibagy, with emeralds, topazes, amethysts, turquoises, and rubies. The climate is mild and equable. There are extensive forests yielding valuable timber and cabinet wood, and many trees and plants furnish useful drugs and dyes. (See Brazil.) Maté or Paraguay tea thrives here, and is largely consumed; coffee, the sugar cane, and tobacco yield good crops, the tobacco having been pronounced at least equal to that of Havana. Vanilla grows spontaneously, and the Chinese tea plant thrives well, but the natives are ignorant of the preparation of tea. Cotton gives two fine crops a year. The expenditure for public instruction in 1873 was $37,810; there were 121 primary schools (35 for females), 5 private night schools, and 8 grammar schools (one for females); and the total number of scholars was 3,268, of whom 892 were females. The capital is Curitiba; chief port, Paranaguá.

PARAPHERNALIA (Gr. παρά, besides, and φερνή, dowry), in law, all the personal apparel and ornaments of the wife, which she possesses, and which are suitable to her condition in life. The word was borrowed from the Roman law. The *dos* or dowry of a Roman wife was that portion which was contributed by her, or in her behalf, toward bearing the expense of the household (*ad sustinenda matrimonii onera*). That part of her property, over and above her *dos*, which she withheld, constituted her *bona* *paraphernalia* (*bona quæ præter dotem uxor habet*). This property generally remained in the hands of her father or *tutor* (guardian), and the husband had no rights over it, except those which were expressly given him by the wife. The wife might dispose of it, or bring an action in respect of it, without his authority or consent. These, and the other rules of the Roman code upon the topic, remain without material modification in the modern civil law of Europe.—In the English law paraphernalia has acquired a meaning which limits it to the personal apparel and ornaments possessed by the wife, and which are suitable to her rank and condition in life. It is essential that these things came to her from the husband, for articles given to the wife by any other, as by her father or other relative, or even by a stranger, are absolute gifts to her, and are secured to her separate use; but the paraphernalia are gifts *sub modo*. During his lifetime the husband may dispose of all of them but her necessary apparel, and, with the same exception, they are subject after the husband's death to the claims of his creditors. Nothing however but insolvency, or complete alienation or sale by the husband, will defeat the wife's right of ownership. Pledge of the goods will not suffice. Her right cannot be defeated by the husband's will bequeathing the paraphernalia. If they were in her possession at the time of her husband's death, she would hold them against his executors or personal representatives.—Paraphernalia is quite an obsolete title in American law, the common law rules on the subject being generally superseded by the provisions of state statutes; and by these the wife surviving her husband is entitled to hold her wearing apparel and personal ornaments against the claims of all other persons.

PARASITIC ANIMALS. See Entozoa, and Epizoa.

PARASITIC PLANTS. See Epiphytes.

PARAY-LE-MONIAL, a town of Burgundy, France, in the department of Saône-et-Loire, 35 m. W. N. W. of Mâcon, and 180 m. S. E. of Paris; pop. about 3,500. It has a remarkable church and a Benedictine abbey founded in 973; but it is chiefly celebrated as having been the abode of Marguerite Marie Alacoque, whose tomb is in the chapel attached to the Visitation convent, in which she lived and died. As she was mainly instrumental in establishing the devotions of the Sacred Heart, which have of late spread so rapidly in Roman Catholic countries, the occasion of her beatification by Pius IX. in 1865 gave rise to numerous pilgrimages to her shrine, which have increased in frequency and numbers ever since. In 1873 and 1874, besides the crowds of pilgrims from France and Belgium, companies went from Great Britain, Ireland, and the United States, headed by distinguished prelates and laymen, their departure from home and their arrival at Paray-le-Monial being marked by impressive religious ceremonies.

PARCÆ (Gr. Μοῖραι), or **Fates,** in Grecian and Roman mythology, daughters of Erebus and Night or of Jupiter and Themis. They had control over the universe, and particularly human destinies, presided over all great events in the lives of men, executed the decrees of nature, and punished criminals through their ministers the Furies, whose sisters they were sometimes said to be. In Homer Μοῖρα is fate personified, and is almost invariably mentioned in the singular; but Hesiod describes three fates: Clotho or the spinner, who spun out the thread of human life; Lachesis, the disposer of destinies, who twirled the spindle while Clotho held the distaff; and Atropos the inevitable, who cut the thread when it had reached its proper length. They are sometimes regarded simply as the goddesses of the duration of human life, in which case they are but two, one presiding over birth and the other over death. They were described by the poets as hideous, stern, and cruel old women. They had shrines in many parts of Greece.

PARCHMENT (Lat. *pergamena*), the skins of sheep and other animals, prepared in sheets to render them fit for being written upon. Parchment was known at a very early period, and the manufacture of it is said to have been improved if not originated by Eumenes II., king of Pergamus (who reigned 197–159 B. C.), whence its name. According to Herodotus, the ancient Ionians wrote on skins many ages before that time, and it is certain that its use was common in Egypt ages before the time of Eumenes. The early Arabs inscribed their poetry and compositions on the shoulder bones of sheep; but after their conquests in Asia and Africa they so profited by the inventions of the nations they subdued, that parchment was manufactured in Syria, Arabia, and Egypt, which in color and delicacy might vie with our modern paper. The ancients generally wrote only on one side of their parchment; but so valuable was it, that they not unfrequently erased the writing and used it a second time. To the present day no substitute has been found for a variety of purposes to which it is applied. The finer sorts of parchment called vellum, used for important writings, as deeds, wills, &c., are manufactured from the skins of calves, kids, and still-born lambs. The heavier parchment for drum heads is made from the skins of asses, older calves, wolves, and goats. All these are similarly prepared. The skin, being freed from the hair, is placed in a lime pit to cleanse it from fat. The pelt is then stretched upon a frame, care being taken that the surface be perfectly free from wrinkles, and dressed with knives, scrapers, and pumice stone. The skin is dried gradually, tightening being occasionally required. If traces of grease remain, it must be replaced in the lime pit for a week or ten days, and again stretched and dried. A green color is given to parchment by a solution made with 30 parts of crystallized acetate of copper and 8 of bitartrate of potassa in 500 of distilled water, 4 parts of nitric acid being added when the mixture is cold. The parchment being moistened, this preparation is applied with a brush, and the polish is given by white of egg or mucilage of gum arabic.—Paper or vegetable parchment is a remarkable substance, first noticed in 1847 by Poumarède and Figuier, who called it papyrine. No practical application was made of the discovery till 1857, when it was patented in England by W. E. Gaine. The material is manufactured in large quantities by De la Rue and co. It is made by dipping unsized paper for a few seconds in a mixture of equal volumes of strong sulphuric acid and water. Complete success requires attention to the strength of the mixture, which must also be allowed to cool before the paper is dipped in it. Paper parchment is used for legal and other documents and maps, for connecting laboratory apparatus, covering preserve jars, and various other purposes.

PARDESSUS, Jean Marie, a French jurist, born in Blois, Aug. 11, 1772, died in Paris, May 26, 1853. He became an advocate, and in 1807 a member of the legislative body in the interest of Napoleon, and was repeatedly elected a deputy under the restoration. He was professor of mercantile law from 1810 to 1830, and was one of the highest authorities on that branch of jurisprudence. His principal work is *Cours de droit commercial* (4 vols., Paris, 1814–'16; 6th ed., 1856). He also published *Traité des servitudes* (1806), *Traité du contrat et des lettres de change* (2 vols., 1819), *Collections des lois maritimes antérieures au XVIII*^{me} *siècle* (6 vols., 1828–'45), &c.

PARDOE, Julia, an English author, born in Beverley, Yorkshire, in 1806, died Nov. 26, 1862. She produced a volume of poems when she was 13 years old, and a novel at 15; but her first important work was "Traits and Traditions of Portugal" (2 vols., 1833). She went to Constantinople in 1835, and published "The City of the Sultan" (3 vols., 1836), and furnished the letterpress for "The Romance of the Harem" (3 vols., 1839), and "The Beauties of the Bosphorus" (2 vols. 4to). She afterward visited Hungary, and wrote "The City of the Magyar" (3 vols. 8vo, 1840), and the novel of "The Hungarian Castle" (3 vols., 1842). Her other works include "Louis the Fourteenth, and the Court of France in the Seventeenth Century" (3 vols., 1847); "The Court and Reign of Francis I." (2 vols., 1849); "The Life of Mary de Medicis" (3 vols., 1852); "Pilgrimages in Paris" (1858); and "Episodes of French History during the Consulate and the Empire" (2 vols., 1859). In 1859 she received from the crown a pension of £100.

PARDON, in its proper sense, the act of grace by which the sovereign declares that the guilty shall be regarded as innocent. In human political societies, this effect is accomplished, not by absolving the moral guilt of the criminal, but by removing or withholding those penal consequences which the law attaches to crime. Chief Justice Marshall's definition may not be altogether exact, but it is often quoted in our law books, and expresses the usual acceptation of the word. "A pardon," he says, "is an act of grace, which, proceeding from the power intrusted with the execution of the laws, exempts the individual on whom it is bestowed from the punishment which the law inflicts for a crime which he has committed." A pardon is then an act not of justice, but of grace. Pardon necessarily implies punishment, or the liability thereto; and punishment supposes guilt, ascertained in the due course of law, and justly visited with a penalty. For, as in the state it must be the theory that the courts have the monopoly of doing justice, so theoretically it must be assumed that he is guilty whom the courts declare to be so, and that the penalty is justly inflicted. If the punishment of such a one be but an act of justice, the remission of it, or a pardon, must be an act of clemency or grace. But it is the chief end of punishment to advance the public welfare. When then the commonwealth will derive more or as much advantage, or even will suffer nothing, from the remission of the punishment, this may well be granted; and this consideration ought to be the measure and guide of the pardoning power. Forgiveness must come of course from the one who is injured, and that, in all states, is the sovereign. The ultimate power, the real sovereignty, whether it reside in a king or in the people, as it is the source of the law, so must it be the source of grace to him who breaks the law. In the forms of government which have most prevailed, the crowned prince has been regarded as the sovereign, and pardon has always been his prerogative. In democratic states, the people are sovereign; but they have generally delegated the power of pardon to him who is placed at the head of the state, that is, to the chief executive magistrate, though in the absence of such delegation the power would pertain to the legislature. The constitution of the United States gives the power to the president alone. In some of the states it is to be exercised with the advice and consent of the council. Sometimes, where it is reserved to the legislature, the governor can only reprieve temporarily. A pardon presupposes guilt, and though it is now well settled that it may be granted as well before trial and conviction as afterward, yet in every case it is to defeat a punishment which the law has prescribed for an act committed, and therefore to defeat and annul so far the law itself. Owing to the imperfection of the laws themselves, or to the imperfect application of good laws, an innocent man may be condemned to punishment, or a slight offence may be visited with too severe a penalty. But remission of the sentence in these cases, whole or partial, according as the sentence is wholly or partially unjust, though regarded as an act of clemency, is, in the one class of cases, only that very justice which the courts in the particular case sought to do, and would have done if at the trial the proofs of innocence had been as clear as they now are, and in other cases it is an equitable indulgence to those who, though within the letter of the law, yet, could their cases have been foreseen, would have been perhaps excepted from its general rules, or who ought to have been excepted, but could never be, because of the necessary imperfection of legislation. But even in these cases, when justice alone is intended to be done, where the innocent, not the guilty, is to be relieved from penalties, it is hardly possible that the so-called pardoning power shall always be judiciously exercised.—The indulgence of pardon extends only to crimes already committed. In no well governed state will the sovereign grant dispensation to crimes to be committed in the future; and in republics, unless the people, which is the sovereign, have expressly delegated such an authority, the executive, which is usually invested with the power of pardon, has no such right of dispensation. Further, as pardon is measured by and regards only the public welfare, it cannot intrude on private rights. Therefore a pardon which takes away other penalties cannot divest a private citizen's right in a forfeiture under a penal statute, or his share in the penalty which such statute secures to the informer. On the principle that the greater power includes the less, it is well established, though it has been sometimes questioned, that the power of pardoning absolutely includes that of pardoning conditionally. Any conditions, therefore, precedent or subsequent, may be annexed to the offer of a pardon; and on the performance of these the validity of the grant may be made to depend. Pardons are therefore sometimes very properly granted on condition that the subjects of them, who have been led into criminal acts by indulgence in intoxicating drinks, shall wholly abstain therefrom; and sometimes, very improperly and in utter disregard of state comity, on condition that they shall leave the state.—In regard to the legal effect of a pardon, it may be observed that in its proper sense it completely rehabilitates the criminal; but usually the executive clemency consists only in a remission of part of the sentence. Now, if the judgment which the law passed upon the offender consisted exclusively in fine or imprisonment, remission of these does in fact restore him to full enjoyment of all his civil rights. But when infamy attaches by particular laws to the conviction, as it does in the case of felonies, forgiveness of the fine or imprisonment only by no means makes the pardoned equal with the innocent; in short, the pardon is partial, or it were perhaps better to say, it is no pardon at all. It must be remarked, however, that this distinction is not invariably recognized; yet the denial of it seems to have introduced a discordance into the decisions of the courts. Thus, in a Pennsylvania case, where the president of the United States had "remitted" to the party offered as a witness "the remainder of his sentence," it was held by the court that the pardon, as it was called, removed the sentence and also the infamy which attended the crime, and therefore restored the competency of the witness. But in Massachusetts, in a precisely similar case, that is, where the pardon "remitted the residue of the sentence," the court distinguished between pardon and the mere annulling of a sentence of imprisonment, holding that the latter could not remove infamy and the consequent incapacity, because that could be effected only by an express forgiveness of the offence, that is, by words which distinctly imported a restoration to all civil rights, and showed the willingness of the pardoning authority to regard the criminal as entirely innocent. Quoting the language of an approved author on criminal practice, the court said the pardon, or rather remission of the punishment only, does not remove the blemish of character, and so does not revive competency. There must be full and free pardon of the offence, before these can be removed or revived. So the English law held that when attainder wrought corruption of blood, the party was not completely reinstated by the king's charter of pardon; and generally it has been laid down in this country, that commutation to a shorter period than a life term to the state prison (which in the American law generally works the civil death of the criminal) does not restore marital rights, or entitle the party to the guardianship of his children. Where these disabilities remain, the pardon is not complete.—A pardon is regarded as a deed; and delivery and acceptance of it are essential to its validity in all cases, whether of capital offences or of misdemeanors. It has therefore been held that where the president had granted a pardon which had been put into the hands of the marshal for delivery to the criminal in his custody, the authority to deliver it might be countermanded at any time before delivery had actually been made, and the pardon thereby become ineffectual. It has also been held in Pennsylvania that a pardon obtained by means of forged papers might be treated as void for the fraud; but in the absence of fraud, a pardon once granted and delivered without condition can be recalled by no authority whatever.—A peculiar remission of punishment has become established in some of the states, by statutes which permit prison authorities to shorten the term of convict imprisonment for good behavior in confinement, the extent of the remission being graduated by fixed rules. This obviously is not pardon, and the laws which permit it do not encroach upon any exclusive power of pardon which may have been conferred upon the governor.

PARÉ, Ambroise, a French surgeon, born at Bourg-Hersent, near Laval, in 1517, died in Paris, Dec. 22, 1590. He went to Paris in his 17th year, and his progress in surgical study was so rapid that in 1536 the captain general of French infantry, René de Montejan, appointed him surgeon to his troops and took him to Italy. After his return to Paris he was elected provost of the college of surgery. In 1552 he was appointed surgeon to Henry II., and afterward to Francis II., Charles IX., and Henry III. He exerted a great influence upon practical surgery, but his reputation rests mainly upon three important improvements: 1. The treatment of gun-shot wounds by simple dressings, instead of boiling oil or the actual cautery, which had been thought necessary on account of the supposed poisonous nature of such wounds. 2. The application of the ligature to blood vessels after amputation, to prevent hæmorrhage, instead of the actual cautery. This was almost as great an improvement as the first, and one of still wider application. 3. The rule that in searching for a bullet the patient should be placed in the same posture as at the moment of receiving the wound. The first edition of his complete works appeared at Lyons in 1562, and the last, edited by Dr. Malgaigne, with notes, at Paris in 1840-'41 (3 vols. 8vo). They were translated into English by T. Johnson (fol., London, 1634).

PAREGORIC ELIXIR (Gr. παρηγορικός, soothing), or camphorated tincture of opium, a preparation of opium and benzoic acid, each 1 drachm; oil of anise, 1 fluid drachm; honey, 2 ounces; camphor, 2 scruples; diluted alcohol, 2 pints; macerated for seven days and filtered through paper. This is a popular medicine, used as an anodyne and antispasmodic. It allays cough in cases of asthma and catarrh, and relieves slight pains in the stomach and bowels. It is especially used for children, on account of the weakness of the preparation permitting a more accurate graduation of the dose; but it should be administered with the same caution as any other preparation of opium.

PAREJA, Juan de, a Spanish artist, born in the West Indies in 1610, or according to Cean Bermudez in Seville, of parents who were slaves, in 1606, died in Madrid in 1670. He accompanied Velasquez as his slave to Madrid in 1628, and mixed the colors and prepared the palette of the artist. Secretly studying the style of Velasquez, he soon painted creditable pictures, one of which attracted the attention of Philip IV. in a visit to the artist's studio, and resulted in the emancipation of Pareja. The slave became the pupil of his master, and imitated him so well that their pictures are sometimes confounded. His works include "The Calling of St. Matthew" at Aranjuez, "The Baptism of Christ" at Toledo, and some saints at Madrid.

PARENT AND CHILD. See INFANT.

PARENT DU CHÂTELET, Alexandre Jean Baptiste, a French physician, born in Paris, Sept. 29, 1790, died there, March 7, 1836. Admitted to the practice of medicine in 1814, he made public hygiene his specialty, and published several works, the more important of which are: *Essai sur les cloaques ou égouts de la ville de Paris* (1824), and *De la prostitution dans la ville de Paris* (2 vols., 1836).

PAREPA-ROSA. See ROSA.

PARHELIA. See HALO.

PARIAHS, a low caste of the Tamil country and race, in southern India, whose name is erroneously applied by Europeans to the outside Hindoo castes generally, of which it is only one, forming but a small part of the outcast population. These low castes are organized under strict and exclusive regulations, like the higher castes above them; and Max Müller says that the lowest Pariah is as proud and as anxious to preserve his own caste as the highest Brahman. The name Pariah is derived from the bell which they were formerly obliged to carry about, to warn Brahmans of the approach of an outcast.—The common domestic dogs of India and Ceylon, mongrels of European descent which haunt the streets and suburbs of cities and sometimes hunt in packs on the plains, are known as Pariah dogs.

PARIAN MARBLES. See ARUNDEL.

PARINI, Giuseppe, an Italian poet, born at Bosisio, near Milan, May 22, 1729, died Aug. 15, 1799. He was of humble birth and occupation, but acquired fame in 1752 by his *Ripano Eupilino*, a volume of poems, and still more by his *Il giorno*, a didactic and dramatic satire. His works were edited by Reina (6 vols., Milan, 1801-'4, and 2 vols., 1825).

PARIS, the capital of France, and the second city in Europe in point of population, on both banks of the Seine and on two islands in that river, 111 m. from its mouth; lat. of the observatory, 48° 50′ 11″ N., lon. 2° 20′ 22½″ E.; height of the city above the sea, 190 ft.; area enclosed within the fortifications, 18,315 acres, or a little more than 28½ sq. m.; pop. in 1872, 1,851,792. With its suburbs it forms a special department, that of the Seine, having an area of 184 sq. m., and a population in 1872 of 2,220,060. The area of the city proper at different dates is shown in the following table:

PERIODS.		Acres.	Sq. m.
Under Julius Cæsar.......... B. C.	56	87	.....
" Philip Augustus....... A. D.	1211	625	.....
" Charles VI............. "	1383	1,084	1·69
" Henry III............. "	1581	1,193	1·86
" Louis XIII............. "	1634	1,403	2·19
" Louis XIV............. "	1686	2,728	4·26
" Louis XVI............. "	1784	8,708	13·60
" Napoleon III.......... "	1860	18,315	28·61

The following table shows the increase of population of the city during the past 80 years, the figures for the first two dates being from the most trustworthy estimates, the others from official censuses:

YEARS.	Population.	Pop. to the acre.	YEARS.	Population.	Pop. to the acre.
1798......	640,000	73	1836.....	909,126	104
1802......	672,000	77	1846.....	945,721	108
1806......	580,609	66	1856.....	1,174,346	135
1817......	713,966	82	1866.....	1,825,274	100
1827......	890,431	102	1872.....	1,851,792	101

The population in 1872 was divided according to nationality as follows:

NATIONALITY.		Males.	Females.	Total.
French.	Born in the department of the Seine	307,812	334,906	642,718
	Born in other p'rts of France	527,023	504,842	1,031,865
	Naturalized foreigners	2,196	1,836	4,032
	Alsatian and Lorrainian immigrants	19,929	17,047	36,976
Persons from Alsace-Lorraine who are German citizens		14,696	16,919	31,615
English, Scotch, and Irish		2,901	4,589	7,490
Americans (North and South America)		1,939	2,181	4,120
Germans		7,284	8,455	15,739
Austrians and Hungarians		1,030	773	1,803
Belgians		17,215	15,697	32,912
Dutch		4,107	3,645	7,752
Spaniards		1,441	1,292	2,733
Italians		5,731	2,358	8,089
Swiss		7,533	4,867	12,400
Russians		560	531	1,091
Poles		1,636	845	2,481
Swedes, Norwegians, and Danes		296	176	472
Turks, Greeks, Wallachs, &c.		507	202	709
Asiatics		105	26	167
Other nationalities		784	742	1,526
Nationality unknown		2,499	2,603	5,102
Total		927,224	924,568	1,851,792

In regard to religious belief, the population was divided into 1,760,168 Roman Catholics, 41,672 Protestants (Calvinists 19,423, Lutherans 12,634, other sects 4,615), 23,434 Jews, 13,905 professing no belief, 1,572 Mohammedans, Buddhists, &c., and 11,041 unascertained. Of the total population over 6 years of age (1,704,152), 175,510 (69,911 males and 105,599 females) were unable to read or write, and 47,467 (21,812 males and 25,655 females) were unable to write; of the former, 135,489 were over 20 years, and of the latter, 28,426. The following table, taken from the figures of the census of 1872, shows, though very generally, the occupations and professions of the population:

PROFESSION OR OCCUPATION.	Persons actively engaged.	
	Male.	Female.
Agriculture (and trades connected with it)	2,361	655
Industries and manufactures	295,211	197,987
Commerce and commercial pursuits	148,651	52,207
Occupations connected with transportation (railways, &c.), with banking, brokerage, and commission	45,661	3,561
Miscellaneous professions *	9,076	6,659
Liberal professions	95,800	17,219
Persons living exclusively from the income of their capital	51,589	59,899
Persons without profession or occupation	5,041	10,217
Persons not classified †	15,484	12,265
Persons whose professions are unknown or have not been determined	4,301	8,432

Paris is divided for administrative and political purposes into 20 arrondissements, each of which is subdivided into four "quarters." Each arrondissement has its mayor (*maire*) and its administrative officers. The official names and numbers of the arrondissements and quarters are shown below (the arrondissements with Roman, the quarters with Arabic numerals):

I. LOUVRE.

1. St. Germ. l'Auxerrois.
2. Halles.
3. Palais Royal.
4. Place Vendôme.

II. BOURSE.

5. Gaillon.
6. Vivienne.
7. Mail.
8. Bonne Nouvelle.

III. TEMPLE.

9. Arts et Métiers.
10. Enfants Rouges.
11. Archives.
12. Ste. Avoie.

IV. HÔTEL DE VILLE.

13. St. Merry.
14. St. Gervais.
15. Arsénal.
16. Notre Dame.

V. PANTHÉON.

17. St. Victor.
18. Jardin des Plantes.
19. Val de Grâce.
20. Sorbonne.

VI. LUXEMBOURG.

21. Monnaie.
22. Odéon.
23. Notre Dame des Champs.
24. St. Germain des Prés.

VII. PALAIS BOURBON.

25. St. Thomas d'Aquin.
26. Invalides.
27. École Militaire.
28. Gros Caillou.

VIII. ÉLYSÉE.

29. Champs Élysées.
30. Faubourg du Roule.
31. Madeleine.
32. Europe.

IX. OPÉRA.

33. St. Georges.
34. Chaussée d'Antin.
35. Faubourg Montmartre.
36. Rochechouart.

X. ENCLOS ST. LAURENT.

37. St. Vincent de Paul.
38. Porte St. Denis.
39. Porte St. Martin.
40. Hôpital St. Louis.

XI. POPINCOURT.

41. Folie Méricourt.
42. St. Ambroise.
43. Roquette.
44. Ste. Marguerite.

XII. REUILLY.

45. Bel Air.
46. Picpus.
47. Bercy.
48. Quinze Vingts.

XIII. GOBELINS.

49. Salpêtrière.
50. Gare.
51. Maison Blanche.
52. Croulebarbe.

XIV. OBSERVATOIRE.

53. Mt. Parnasse.
54. Santé.
55. Petit Montrouge.
56. Plaisance.

XV. VAUGIRARD.

57. St. Lambert.
58. Necker.
59. Grenelle.
60. Javelle.

XVI. PASSY.

61. Auteuil.
62. La Muette.
63. Porte Dauphine.
64. Des Bassins.

XVII. BATIGNOLLES-MONCEAUX.

65. Ternes.
66. Plaine de Monceaux.
67. Batignolles.
68. Épinettes.

XVIII. BUTTE MONTMARTRE.

69. Grandes Carrières.
70. Cliquancourt.
71. Goutte d'Or.
72. La Chapelle.

XIX. BUTTES CHAUMONT.

73. La Villette.
74. Pont de Flandre.
75. Amérique.
76. Combat.

XX. MÉNILMONTANT.

77. Belleville.
78. St. Fargeau.
79. Père Lachaise.
80. Charonne.

In spite of the official designations given above, some ancient names and others coined in recent times are always applied in popular parlance to certain of the quarters. The most prominent examples of this are the old names quartier St. Antoine, applied to the whole region surrounding the present place de la Bastille; de la Cité, to the island on which the chief part of mediæval Paris was built; faubourg St. Germain, to the greater part of the 7th arrondissement and a small part of the 15th. Of coined names, the most commonly used are those of Latin quarter (quartier Latin), applied to the former quartier St. Jacques (now forming part of the quartier du Panthéon), and quartier Bréda, to the region occupying the northern part of the quartier de l'Opéra and its vicinity.—The climate of Paris is variable, but very healthful, moist rather than dry, with an average annual rainfall, in 105 rainy days, of 22 inches. Falls of snow are rare and slight. The mean temperature is 51° F., the average summer and winter extremes being respectively 96° above and 1° below zero. The city lies in a nearly level plain, broken on the right bank of the Seine by a range of hills (*buttes*) about two miles from the river. This plain extends above a singular geological formation called the Paris basin, the arrangement of which presents a peculiar assemblage of natural advantages; its different strata supply the city's water, its building stone, gravel, &c. Over an inexhaustible reservoir which, tapped by artesian wells, supplies extensive quarters of the town with water, spreads, first, the great chalk formation, to which succeed in ascending order the following layers: plastic clay, marine limestone, silicious (fresh-water) limestone, gypsum, alternating with marls abounding in fossil remains. The alluvial deposit is of great fertility, yielding incessant crops. It is estimated that 824,000,000 cub. ft. of building stone have

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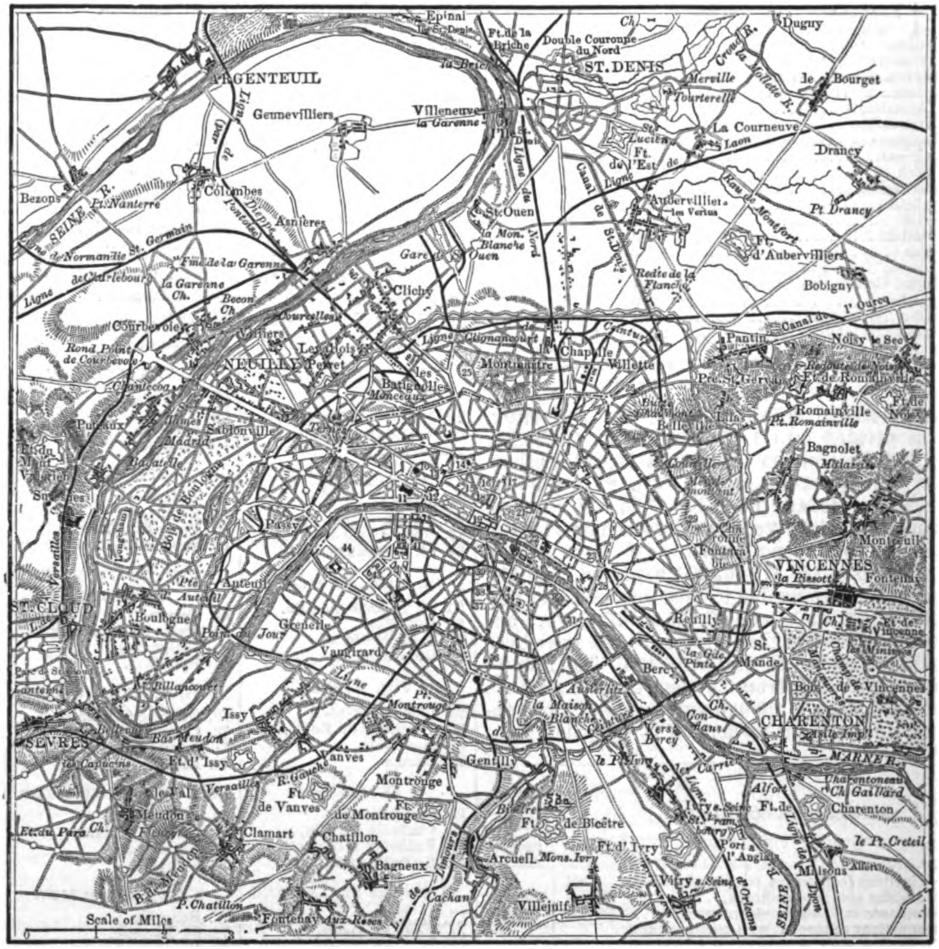
* The more detailed French tables include in this category landlords, keepers of baths and gymnasiums, exhibitors, acrobats, and other classes.

† Foundlings, the sick in public hospitals, inmates of prisons and asylums, &c., &c.



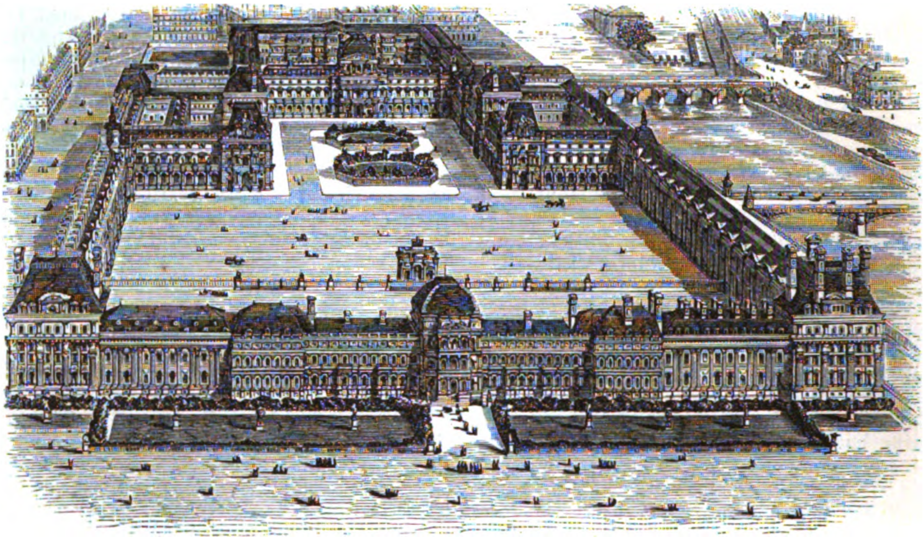
Paris and its Environs.

———————— Bounds of city under Louis VII.
- - - - - - - - - - - Bounds under Philip Augustus.
-·-·-·-·-·-·-·- Bounds under Louis XIV.
-··-··-··-··-··- Barriers under Louis XVI.

1. Hôtel de Cluny. 2. Institut de France. 3. Notre Dame. 4. Palais de Justice. 5. Place du Roi de Rome. 6. Avenue Bois de Boulogne. 7. Arc de Triomphe. 8. Avenue des Champs Elysées. 9. Parc de Monceaux. 10. Palais de l'Elysée. 11. Palais de l'Industrie. 12. Place de la Concorde. 13. Madeleine. 14. Grand Opera. 15. Place Vendôme. 16. Théâtre des Italiens. 17. Bourse. 18. Palais Royal and Théâtre Français. 19. Tuileries. 20. Louvre. 21. Halles Centrales. 22. Hôtel de Ville. 23. Place Royale. 24. Place de la Bastille. 25. Cemetery of Montmartre. 26. Bassin de la Villette. 27. Custom House. 28. Gare de l'Arsenal. 29. Cemetery of Père Lachaise. 30. Place du Trône. 31. Jardin des Plantes. 32. Wine Market. 33. Collége de France. 34. Sorbonne. 35. Pantheon. 36. Observatory. 37. Luxembourg Garden. 38. Palais du Sénat. 39. St. Sulpice. 40. Corps Législatif. 41. Archiepiscopal Palace. 42. Hôtel des Invalides. 43. Military School. 44. Champ de Mars. 45. Cemetery of Mont Parnasse.

been extracted from the now exhausted quarries, which underlie about one eighth of the surface of the city, and have been used as catacombs since 1784. (See CATACOMBS.) The Seine, approaching from the south, receives the Marne little more than a mile outside the enceinte, enters the city at its S. E. corner, flows N. W. and then S. W., leaves the enceinte at its S. W. extremity, and passes in great bends, like the letter S, across the fertile plain between Paris and the forest of St. Germain, 10 m. N. W. The steep hills of Montmartre and the Buttes Chaumont, both within the city limits, and both hollowed by constant quarrying for gypsum, form the only other noteworthy natural features of the city's site. Paris is surrounded by a complete belt (*enceinte*) of fortifications, broken by 57 gates, besides the entrances of railways. It consists of a bastioned and terraced wall, 21 m. in circuit, presenting 94 bastions, designated by their numbers in order, proceeding N., W., S., and E. around the circuit from the entrance of the Seine back to that point. The whole is surrounded by a continuous ditch 22 m. in circuit and 49 ft. wide. The wall has 34 ft. of escarpment, faced with stone 11 ft. thick. This interior system of defence is supplemented by the following 16 outlying forts, named in their order from the Seine in the direction described above in the case of the bastions, and the distance from the enceinte being given in each case: Charenton, 3,600 yards; Vincennes, 2,290; Nogent, 5,342; Rosny, 5,069; Noisy, 3,270; Romainville, 1,570; Aubervilliers, 2,071; Est, 3,815; Double Couronne du Nord, 5,450; La Briche, 5,560; Mont Valérien, 4,360; Issy, 2,400; Vanves, 2,290; Montrouge, 1,690; Bicêtre, 1,635; Ivry, 2,725. Forts de Nogent, Rosny, and Noisy are beyond the eastern limit of the plan given with this article.—According to the census of 1872, the city of Paris contained 3,619 streets, places, courts, squares, quays, and other places of public right of way; 300 isolated public edifices, besides public buildings included in blocks or groups with other structures; and 63,963 houses, of which 61,622 were inhabited, 1,947 uninhabited, and 394 in process of construction. Of the inhabited houses, 694 were occupied by public establishments, and 60,928 by private citizens. In these houses were 851,513 *locations*, or arrangements for separate dwellings (as these are usually arranged in continental cities, a considerable number in each house). Of these, 694,095 were occupied by private citizens, 65,257 were vacant, and 92,161 were occupied by industrial and commercial establishments, &c. The most noteworthy of the Paris thoroughfares are the boulevards (from the German *Bollwerk*, bulwark or rampart; the great thoroughfares passing round the borders of many French towns are so designated from their having generally taken the place of old fortifications). The most famous and the oldest of these are the *boulevards intérieurs*, on the site of the old walls destroyed about 1670, and extending from the Madeleine to the place de la Bastille. Beginning at the church of the Madeleine, and going east, the successive portions of their extent are called the boulevards de la Madeleine, des Capucines, des Italiens, Montmartre, Poissonière, Bonne Nouvelle, St. Denis, St. Martin, du Temple, des Filles du Calvaire, and Beaumarchais; leading from the place de la Bastille to the Seine are the boulevards de l'Arsénal and de Bourdon. The name boulevards is also applied to the following new and beautiful streets which were among the public works completed under Napoleon III.: boulevard du Prince Eugène, from the château d'Eau to the place du Trône; Malesherbes, from the Madeleine to the place Wagram; de la Reine Hortense, from the Arc de Triomphe to the Jardin Monceaux; Haussmann, from the avenue de Friedland to the boulevard Montmartre; Richard Lenoir, from the place de la Bastille to the Douane; de Strasbourg, continued by the boulevard de Sébastopol, from the Strasburg railway station to the Seine. The *boulevards extérieurs* form a line of broad and continuous road on the site of the old *octroi* wall. Distinctive names are also applied to their various portions. The *boulevards intérieurs*, and especially those of Montmartre, the Italiens, and the Capucines, are the very centre of the brighter part of the life of Paris. Along them, or near by, in the streets opening from them, such as the rue de la Paix, chaussée d'Antin, boulevards Malesherbes and Haussmann, the rues Laffitte, Vivienne, and Richelieu, are shops with the costliest silks, rarest jewels, and finest works of art; restaurants and cafés wainscoted with mirrors, where the latest news and rumors of the day are reported or invented; the great banking houses; the best opera houses and theatres; the most fashionable or otherwise noted loungers and celebrities of the town. "France is the centre of civilized nations, Paris is the centre of France, the boulevard des Italiens is the centre of Paris," says an enthusiastic modern Parisian.—Besides the boulevards, there are in Paris a great number of other streets having, like the rue de Rivoli, rue Royale, rue Castiglione, &c., an almost world-wide fame for their beauty or the activity and life prevailing in them; but what gives to the city its especial attraction is the multitude of beautiful and universally frequented promenades, places, gardens, and squares. The most noteworthy succession of these is the remarkable series which begins with the exterior gardens of the Louvre. From these lofty colonnaded archways give entrance to the beautiful court of that palace; beyond is the place Napoléon with its garden, surrounded by the ornate inner façades of the new Louvre, except on one side, that opens on the place du Carrousel. This is an immense palace court, the chief ornament of which is a triumphal arch, designed after the arch of Septimius Severus at Rome, adorned by eight

Corinthian columns in red marble and surmounted by a triumphal car and four bronze horses, modelled after the horses of St. Mark in Venice. This court is bounded on the west side by what was the main body of the Tuileries palace, whose western façade, 1,000 ft. long, now in ruins, looks on the gardens of the same name, with their flowers, fountains, statuary, orange trees, and groves of horse chestnut trees, through which the grand alley leads to the finest square in Paris, once named place de Louis XV., then baptized place de la Révolution in blood flowing from the guillotine set up there in the reign of terror, and since styled place de la Concorde. It is ornamented with balustrades and rostral columns, and with eight pavilions, each surmounted by a figure representing one of the principal French towns, Strasburg still among the rest. In the middle of the place, between two fine fountains, rises the obelisk of Luxor, a monolith 72 ft. high, first set up in front of the great temple of Thebes 32 centuries ago by Rameses II. It stands on the spot where once stood a bronze equestrian statue of Louis XV., which was afterward melted into republican cannon, and where his grandson was executed. It was erected here in 1836 by the orders of Louis Philippe. On the north of the square are two palaces, each 288 ft. front, with colonnaded façades resting on arcades; they are separated by the rue Royale, 90 ft. wide, which opens a view of the portico of the Madeleine. On the south and on the left bank of the Seine, crossed here by a fine bridge partly built of stone from the Bastile, are the Palais Bourbon and palace of the ministry of foreign affairs, beyond which are seen the spires of Ste. Clotilde and the gilded dome of the Invalides. On the W. side, between two groups in white marble by Coustou, each representing an impatient horse restrained by an attendant, is the entrance to the grand avenue of the Champs Élysées, which is a mile and a quarter long. The Champs Élysées are planted with trees and laid out in parterres profuse with flowering plants and shrubs. Here are cafés, open-air concerts, marionette theatres, apparatus for children's games, and a hundred tasteful booths stored with playthings and toothsome refreshments; and on all pleasant days and evenings in the mild season a multitude of old and young, strolling or sporting under the trees, or sitting on the rows of chairs along the sidewalks watching the carriages and horsemen that throng the avenue. For other tastes there are a circus and a panorama; and in close proximity the Mabille, the most brilliant and notorious of Paris dancing gardens. On the Champs Élysées also is the *palais de l'industrie*, originally constructed for the world's fair of 1855, whose ample spaces are now put to use for national exhibitions of industry, horticulture, agriculture, the fine arts, &c., some one or more of which are held there yearly. Midway in its course the avenue spreads into a circular place, called the *rond point*, embellished with fountains, and thence continues, bordered now with stately houses, to the place de l'Étoile. Here is the arch of triumph, begun by the first Napoleon for a monument to himself and the glory of the *grande armée*, but only completed by that peace-loving monarch Louis Philippe. It is the grandest extant structure of its kind, rising in harmonious proportions from a base of 147 by 75 ft. to a height of 162 ft. The central archway is 48 ft. broad and 95 ft. high. The inner walls are inscribed

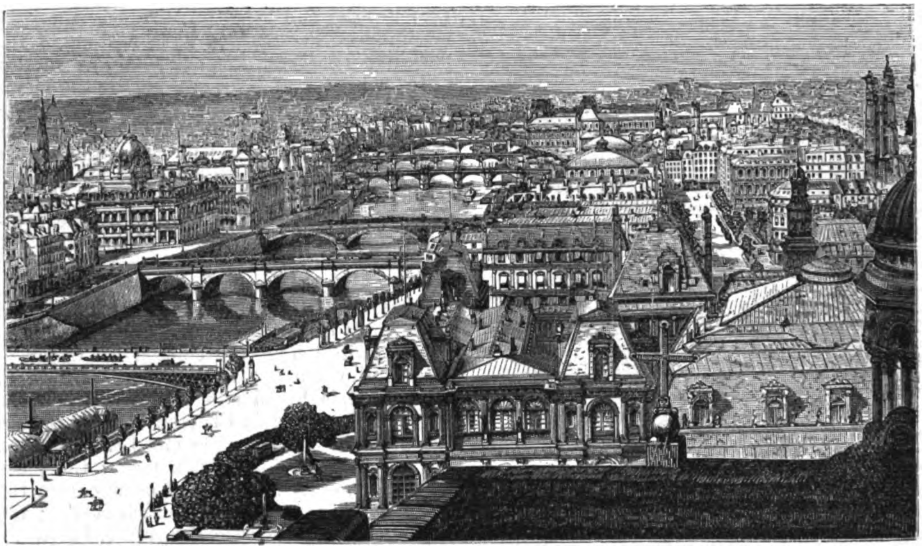


The Tuileries and Louvre, before 1871.

with the names of 384 generals and 96 victories. Its most striking sculptured decorations are four groups of colossal figures in high relief, one of which, by Rude, symbolizing the departure of the recruits for the army in 1792, seems inspired by the patriotic fighting force and passion of that time. Radiating from the place de l'Étoile are ten broad avenues. One of these is the avenue Bois de Boulogne (formerly de l'Impératrice), a mile long and 300 ft. wide. It consists of a carriage-way, footwalks, and a bridle road, and is bordered by continuous gardens, beyond which on either hand is again a carriage road, and yet beyond gardens and villas. This leads to the Bois de Boulogne, a park of 2,500 acres, just outside the fortifications. Laid out since 1852 in the modern style of landscape gardening, its broad roads, mazy paths, and shaded groves are the resort of all classes of Parisians. Within its boundaries are artificial lakes, of which the largest is three fourths of a mile long, a respectable waterfall, two race courses, and the *jardin d'acclimatation*. This last, occupying 33 acres, tastefully laid out, is a model in its kind. The only other of the large "exterior" parks of Paris, besides the Bois de Boulogne, is the park of Vincennes, on the eastern side of the city. (See PARK, and VINCENNES.) The *jardin des plantes*, a botanical garden with zoölogical museum and menagerie, much like the zoölogical gardens of London, is on the left bank of and near the river, in the S. E. part of the city. It is a parallelogram of 57 acres, and is admirably laid out and kept. The menagerie is one of the most perfect in the world. The gardens of the Luxembourg are also on the left bank, in the quarter and beside the palace of that name. They cover 85 acres, are beautifully laid out, and have some especially fine alleys of trees and flowers. The Parc Monceaux, at the extremity of the boulevard de Malesherbes, is another pleasant garden, its present tasteful arrangement being the result of quite recent improvements by the municipality. Many of the squares throughout the city have something of the character of small parks, from the shade trees and flowers with which they are embellished; nearly all the larger ones have fountains, generally very tasteful and beautiful. Among the public places of Paris which have nothing of the park-like character, but are generally merely paved squares, the chief are, besides the places de la Concorde, du Carrousel, and others already mentioned, the place de l'Hôtel de Ville, one of the largest; place de la Bastille, on the site of that fortress, embellished by the tall "column of July," a bronze pillar 154 ft. high dedicated to the citizens who fell in the revolution of 1830; the place Vendôme, with the famous column Vendôme in its centre, a shaft 143 ft. high, of stone covered with bronze, on which are bass reliefs commemorative of Napoleon's campaigns in 1805, the whole being in imitation of the column of Trajan at Rome; the broad place du Palais Royal, S. of the Palais Royal and between it and the Louvre; the place du Château d'Eau, between the boulevards du Temple and St. Martin, an irregular but extensive open place; the place de l'Opéra, deriving its chief beauty from the great opera house, before which it lies; the place du Trône, an extensive place, but away from most of the centres of activity; the place du Trocadéro, a fine and elevated place opposite the Champ de Mars; the place Notre Dame, before the cathedral of that name; the place St. Michel, on the left bank opposite the island; the place des Victoires, with an equestrian statue of Louis XIV.; the place du Châtelet, &c. Among the open spaces of the city, the Champ de Mars deserves special mention. It is an extensive parade ground, about 1,000 yards by 500, on the left bank of the Seine, between the river and the military school. It was laid out in 1790, and the rampart of turf around it was completed in the week between July 7 and 14 of that year, by 60,000 volunteers, men and women, who worked night and day in their eagerness to prepare the field for the great *fête de la fédération* when the king swore allegiance to the constitution. It has been the scene of many very remarkable historic events, and is now used for great reviews, &c. The buildings of the universal exposition of 1867 were erected upon it, but the greater part have been removed.—The bridges of Paris, 26 in number, are as follows, named in the order in which they cross the Seine, beginning at the entry of the river into the city: ponts National, de Bercy, d'Austerlitz, de Constantine, de la Tournelle (left of the île St. Louis), Marie, Louis Philippe (these two right of the île St. Louis), St. Louis (connecting the two islands), de l'Archevêché, au Double, St. Charles, St. Michel (these four on the left of the île de la Cité), d'Arcole, Notre-Dame, au Change (these three on the right of the île),

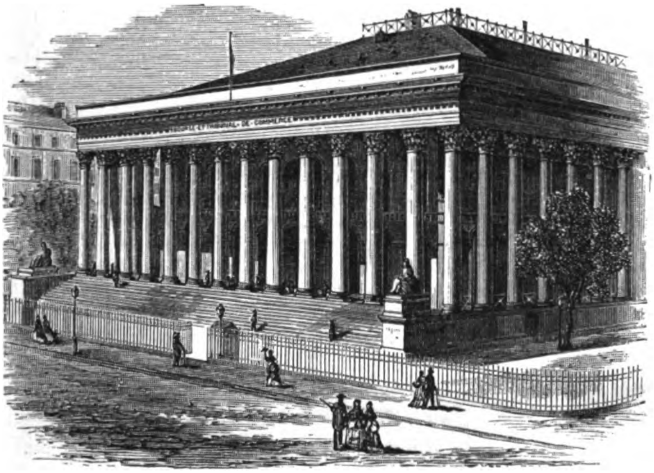
Arc de Triomphe de l'Étoile.

Neuf, des Arts, du Carrousel, Royal, de Solférino, de la Concorde, des Invalides, de l'Alma, d'Iéna, and de Grenelle, besides a railway bridge. Among the finest of them are the seven shown in the accompanying illustration, those from the pont d'Arcole to the pont Royal, inclusive.—The so-called *passages* form a noteworthy class of Parisian thoroughfares; they are narrow streets or alleys, roofed with glass, intended for foot passengers only, and lined with shops, &c. The best known are the passage des Panoramas, the passage Vivienne, and the passage Choiseul. Besides boulevards, avenues, streets, &c., the great *quais* along the banks of the Seine must not be forgotten in naming the Parisian public ways. These are too numerous to particularize here, but all afford wide promenades along the river, and are among the most lively and pleasant of the city thoroughfares. The streets throughout the city are paved with asphalt, which has proved remarkably successful as to durability and convenience. It is said that another motive to the use of this pavement, like the arrangement of the streets in radii easily commanded by artillery from a central point, was found in strategic reasons; the square stones of the old paving furnishing great facilities for barricade building, as proved on several occasions.—Among the most remarkable public works of Paris is its great system of sewerage. The main sewers, resembling enormous subterranean canals, are of recent date, nearly all the present ones, with most of their branches, having been constructed since 1855. In general the network of sewers corresponds to that of thoroughfares, the small sewers passing into the large ones as the streets into the boulevards and avenues, and the contents of the whole finally passing into a few enormous mains, like that under the rue de Rivoli. These again empty into two subterranean canals, which carry the sewage away from the city and debouche into the Seine 7 m. below. The aggregate length of main drainage in Paris now reaches the surprising extent of more than 250 m. For details of their construction, &c., see Sewerage.—The enormous quantity of water consumed by the city is drawn from the Seine and the canal de l'Ourcq, the aqueduct of Arcueil, and the immense artesian wells of Grenelle and Passy. (See Artesian Wells, vol. i., p. 775.) Great aqueducts, begun in 1863, are still in progress, by which it is designed to supply in addition water from the Dhuys and the springs in the valley of the Vanne. There is now under the streets of Paris a total length of about 92 m. of water pipes, and the water brought by them is distributed through more than 200 public fountains, about 60 ornamental fountains, nearly 4,500 hydrants, and about 4,000 drinking places, watering troughs, public washing places, and other similar channels. Of the 220,000 cubic metres daily distributed, 135,000 are used for watering the streets, washing out sewers, &c., and for the public fountains; 15,000 are reserved for government and official uses; and 70,000 are used for the ordinary supply to citizens.—In 1874 there were employed in Paris 10,000 hackney coaches, owned and directed by several large companies, 725 omnibuses, and about 250 railway omnibuses, besides a considerable number of horse cars. A line of railway encircles the city (the *ligne de ceinture*), affording important strategic as well as popular facilities for communication.—Among the beautiful or famous buildings of Paris, proba-

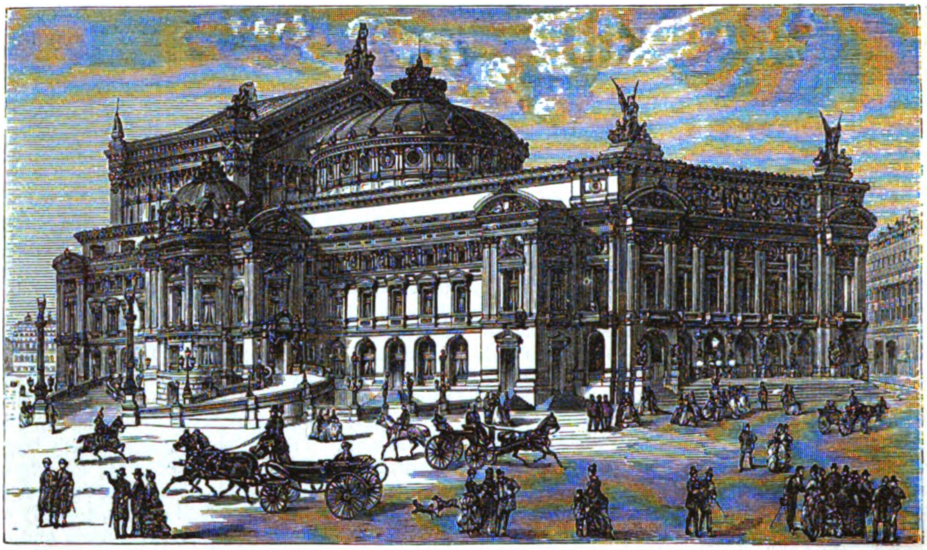


View of the Seven Bridges.

bly the best known are the palaces. Of these the two principal (now united) are described in special articles. (See LOUVRE, and TUILERIES.) Near them stands the Élysée palace, at present the residence when he is in the city of the president of the republic. It was built early in the 18th century by a private nobleman; was next purchased and for a time occupied by Mme. de Pompadour, who added to its pretty garden a part of the Champs Élysées; it was afterward set apart for the use of ambassadors extraordinary sent to the court of France; then fell into the hands of the rich banker Beaujon, and passed from him to the duchess of Bourbon; was used as a printing house during the early years of the revolution, and then sold to private speculators, who converted it into a place of public amusement; was afterward bought and inhabited by Murat, till he left it to be king of Naples, when it again became government property, and was at different times occupied by Napoleon I. It has been inhabited by the duke of Wellington and Alexander I. of Russia. Louis XVIII. restored to it one of its earlier names, Élysée Bourbon, and gave it to the duke de Berry, after whose assassination it descended to the duke of Bordeaux. After December, 1848, it took the name of Élysée Nationale, and became the official residence of the prince president Louis Napoleon, who on becoming emperor changed its name to Élysée Napoléon, and intended it for the ultimate residence of the prince imperial. The palace on the quai d'Orsay was destined by Napoleon I. to be the residence of his son, the king of Rome; Charles X. had more work done on this fine edifice with a view to fitting it for national industrial exhibitions; Louis Philippe completed it; Louis Napoleon's imperial council of state occupied it while the second empire lasted; the followers of the commune burned it. The still standing walls are beautiful. By its side, entirely restored from its injuries, is the ornate little palace of the legion of honor, built in 1784 by the prince of Salm, who was guillotined in 1794, when it was disposed of by lottery, and fell to a journeyman hair dresser. The Luxembourg palace is remarkable for its happy combination of graceful lines with solidity of effect; the gardens are not inferior to those of the Tuileries. The hôtel de ville, between the rue de Rivoli and the river, opposite the upper end of the île de la Cité, was, before its almost total destruction under the commune in 1871, a beautiful building in the style of the renaissance, forming a quadrangle about 800 ft. by 250, and having three courts. Its exterior is profusely ornamented, several hundred statues in niches forming part of its decorations; while the state apartments within were among the most magnificent rooms in the world, the great *galerie des fêtes* being especially splendid. This structure is connected with nearly every important event in the modern history of Paris. It was begun in 1533, and the first building, about one fourth the size of the subsequent one, was finished in 1628. It remained almost untouched till 1837, when improvements were begun, and in 1842 it was enlarged to its greatest dimensions. Its whole cost has been estimated at 16,000,000 francs. In 1873 the government selected for the reconstruction of the burned edifice the plans of Messrs. Ballu and Deperthes, who rebuild it very much in the old fashion. The Palais Royal is a very large quadrangular building, surrounding an extensive court or garden about 230 yards by 100, the scene of many historical events, notably of public meetings during the revolution, and of the speeches of Camille Desmoulins and others. The lower story is now occupied by ranges of shops, among the finest in Paris. The palace has been the residence of various members of the successive ruling families of France. The Hôtel des Invalides, occupying, with its courts, &c., an area of about 16 acres near the left bank of the Seine, W. of the faubourg St. Germain, was founded under Louis XIV., in 1670, as an asylum for veteran soldiers, and has been enlarged by later sovereigns. In the church of St. Louis, forming a part of the Invalides, is the tomb of Napoleon I., the great porphyry sarcophagus standing directly under the dome which crowns the edifice. Other noteworthy public buildings are the Palais de Justice, the Bourse (shown in the accompanying engraving), the military school,



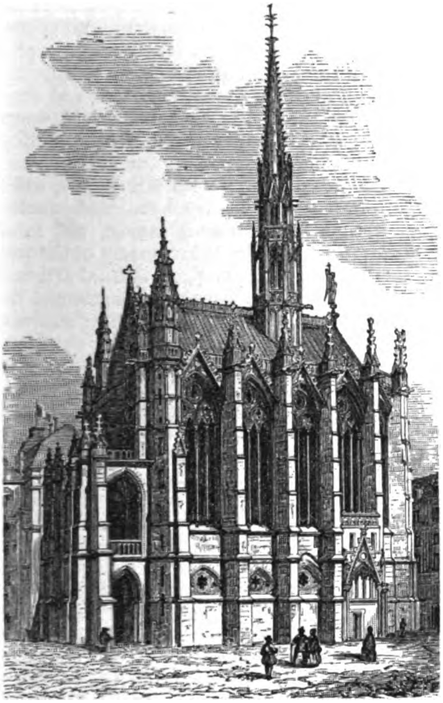
The Bourse.



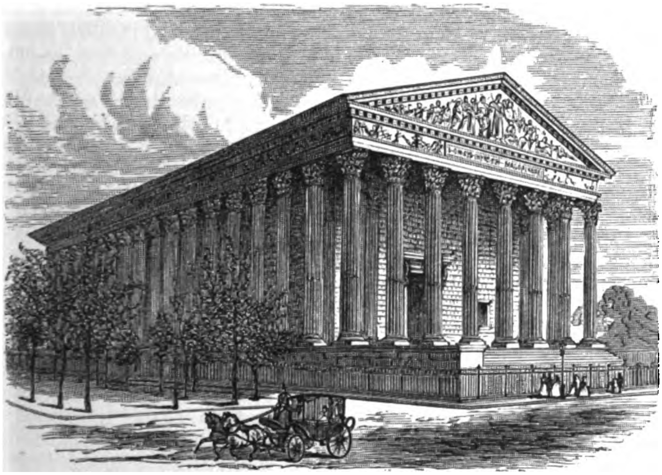
New Opera House.

and the magnificent and richly decorated opera house, built just before the end of the second empire.—Many of the churches are remarkable for their architecture, paintings, or historic associations. Most impressive of all is the cathedral of Notre Dame, a noble specimen of the early pointed style of so-called Gothic; it is cruciform, with an extreme length of 390 ft., width of transepts 144 ft., height of vaulting 105 ft., width of western front 128 ft., flanked by two massive towers 224 ft. high. (See CATHEDRAL, vol. iv., pp. 118, 119.) Near by is the arrowy spire of la Sainte Chapelle. This church was originally built in the surprisingly short space of three years, 1245-'8, by order of St. Louis, to contain the crown of thorns and piece of the true cross bought by that monarch from the emperor of Constantinople. Injured by the wear of time, wasted by fire, desecrated to a strange variety of base uses before, during, and after the revolution, the labor of restoring it to almost more than its original splendor busied learned archaists and skilled architects from 1837 to 1867. "It now presents," says the most eminent of them, "the completest, perhaps the finest, specimen of the religious architecture of the middle of the 13th century." St. Germain des Prés is a venerable instance of the Romanesque style; that of the renaissance is largely illustrated in St. Eustache, and more curiously in St. Étienne du Mont; the Italian or Palladian style beautifully in St. Paul et St. Louis. Ste. Geneviève, an immense pile, better known as the Pantheon, is distinguished for its Corinthian portico of columns 60 ft. high, supporting a sculptured ped-

Church of Notre Dame, rear view.



La Sainte Chapelle.



The Madeleine.

iment, and for its lofty dome, which, however, in every quality but size, is far inferior to that of the church of the Invalides, the masterpiece in its kind of the time of Louis XIV. (See Pantheon.) St. Germain l'Auxerrois, apart from its rich ornamentation, claims attention because from its belfry was given the signal for the St. Bartholomew massacre; St. Gervais for a singularly beautiful chapel. The exterior of the Madeleine presents a grand reproduction of pure antique forms. It stands on a raised platform 328 ft. long by 138 ft. broad, which is ascended at either end by a flight of 28 steps; a surrounding colonnade of 52 pillars 49 ft. high, supporting a richly sculptured frieze and cornice, intercolumnar niches in the side walls filled with colossal statues of saints, the largest sculptured pediment in the world crowning the noblest portico the world has seen since the Athenian Parthenon, are the eminent features of this magnificent Christianized Grecian temple. St. Vincent de Paul, Notre Dame de Lorette, Ste. Clotilde, St. Augustin, and the Trinité are noteworthy, if not altogether admirable, as exemplifications of contemporary architectural talent and decorative taste in their application to religious purposes. In the spring of 1875 the assembly resolved upon the erection of a magnificent "votive church," to cost 10,000,000 francs, on the summit of Montmartre. The corner stone was laid June 29, 1875.—Many of the hotels of the city (notably the Grand Hôtel on the boulevard des Capucines, and the Hôtel du Louvre on the rue de Rivoli, both belonging to a large stock company), and several of the club houses (especially that of the Jockey club on the corner of the boulevard and the rue de Helder), are fine and luxuriously fitted structures; and there are many beautiful private residences, especially in the neighborhood of the Champs Elysées.—Everything relating to the public charities of Paris is subject to the superior control of the general administration of public assistance, which is itself a dependence of the ministry of the interior. It has at its head a director and a council of general management composed of 20 members, presided over by the prefects of the Seine and of police. Within its jurisdiction, besides *bureaux de bienfaisance* in each of the 20 arrondissements, and an extensive system of outdoor aid, are 34 general and special hospitals, almshouses, asylums, and retreats; five others are under the direct charge of the minister of the interior, and three military hospitals under the direct charge of the ministry of war. The chief of the hospitals is the very ancient and famous institution of the Hôtel-Dieu, founded early in the 9th century by the brothers of St. Christopher, who called it the hospital of St. Christopher. The names Notre Dame and Maison-Dieu de Paris were subsequently applied to it, that of Hôtel-Dieu first occurring in an act of Louis

VII. It occupied successively a number of buildings, frequent changes to larger quarters being necessary on account of the rapid growth of its needs. Its present structure, begun in 1868 and finished in 1874, stands on the île de la Cité near the church of Notre Dame. It covers 22,000 square metres of land, and includes three separate series of buildings. There are nearly 1,000 beds, under the charge of a medical and surgical staff of more than 100 persons. Other general hospitals of note are la Pitié, la Charité, Lariboisière, the hospitals St. Antoine, Necker, Cochin, &c. Special hospitals are those of St. Louis for cutaneous diseases; du Midi and Lourcine, for the treatment respectively of males and females for syphilitic disease; a hospital for children; and la Maternité, for accouchements. The average annual number of admissions to the hospitals is 62,500 medical and 23,000 surgical cases; of cures, 54,000 medical and 22,000 surgical cases; of deaths, 8,000 medical and 1,400 surgical cases. The whole number of beds in hospitals and hospices is 19,600. For an account of the administration of the Paris prisons and penitentiaries, see PRISON. The most famous prison building remaining since the destruction of the Bastile is the Conciergerie, on the left bank of the Seine, adjoining the Palais de Justice; the chief modern prisons are those of the Mazas and La Roquette. For accounts of several other noteworthy features of Parisian administration see CEMETERY, MONT DE PIÉTÉ, and MORGUE.—Paris is still honorably distinguished for its higher educational institutions, although under the late empire they somewhat declined, at least relatively, in respect of sciences and letters, from the capital rank they had attained before 1850. The *académie universitaire*, the much changed descendant of the famous old university of Paris (which embraced the college of the Sorbonne), consists of five schools or faculties, theology, law, medicine, science, and letters, each with a numerous corps of professors. The number of students is ordinarily between 7,000 and 8,000. The collége de France has 36 professors in all departments of letters, philosophy, and science. Their lectures are public and gratuitous, as are those of the 16 professors who lecture on natural history, comparative anatomy, botany, geology, chemistry, and the connected sciences at the museum of natural history, and of an equal number at the conservatory of arts and trades, the principal object of whose teaching is the application of science to the industrial arts. Among other special schools worthy of mention are: the polytechnic school, corresponding somewhat to the American military academy at West Point; the school of roads and bridges (*école des ponts et chaussées*), for instruction in all branches of civil engineering; the school of mines, for instruction in the arts and sciences bearing upon mining operations; the central school, for the practical education of civil engineers, architects, and directors of manufacturing establishments; the *école d'état major*, for the education of military staff officers; the normal school, with 27 professors; the school of charts, with seven lecturers on palæography, political institutions, and diplomacy; the school of fine arts, with a museum and courses of instruction in every department of the plastic arts by eminent theorists and artists; the free school of design, mathematics, and ornamental sculpture; the free school of design for young women under the direction of Rosa Bonheur; the conservatory or academy of music and declamation, with 600 pupils, which counts among its 70 teachers and masters in vocal and instrumental music, and in all branches of the histrionic art, many of the most eminent composers and professional artists of the day; six schools for the education of Roman Catholic priests, of which the seminary of St. Sulpice with 14, and that of Notre Dame with 17 directors and professors, are the principal; and a seminary for the education of Israelitish pastors. The six lyceums of Paris are national institutions, where the course of classic and scientific instruction is shaped with a view to the pupil's further study for one of the liberal professions on his entrance to the polytechnic and other superior scientific schools. The colleges of Ste. Barbe (on the list of whose alumni are the names of Ignatius Loyola and John Calvin) and St. Stanislas are immense private establishments. The colleges Rollin and Chaptal, and the école Turgot, are municipal institutions, where the course of study looks rather to the pupil's career in the ordinary paths of business life. There are numerous large public libraries in Paris, six of which are daily open to all comers. The largest of these, having for its only rival that of the British museum, is the national (formerly royal or imperial) library. It contains more than 2,000,000 printed volumes, 150,000 manuscripts, 300,000 maps, charts, and topographical views, 1,300,000 engravings, and a cabinet of coins and medals numbering over 150,000 objects. This invaluable collection is constantly increased by gifts and purchases, and by the action of a law as old as the time of Henry II. (1556), which requires the deposit of a copy of every new thing printed in France. The libraries next in importance for the number and value of their printed and manuscript treasures are the Mazarin, the Arsenal, Sorbonne, and Ste. Geneviève. The large libraries belonging to some of the schools, ministries, and other national institutions are rich in special departments of science and literature. They are not freely open to the public, but every reasonable application for access to them is generally granted. For an account of the five academies composing the *institut de France*, see ACADEMY. The observatory has been briefly described as "the headquarters of astronomical science," a name it long deserved. Besides public institutions, some of the more important of which are mentioned above, there is hardly a department of science, literature, or art which has not one or more societies or associations for its study, encouragement, or exercise. —Among the most notable museums of Paris, that of natural history connected with the *jardin des plantes*, the common name for large zoölogical as well as botanical gardens, is remarkably rich in comparative anatomy, anthropology, zoölogy, minerals, geology, and botany. The museums of morbid and comparative anatomy belonging to the medical school are of excellent fulness in their kind. That of the hôtel de Cluny, itself a curious relic of the architecture of the 16th century, built partly over the foundations of an imperial Roman palace, is consecrated to furniture, arms, and works of art of the middle ages and the renaissance, and to some Gallo-Roman antiquities. That of the conservatory of arts and trades contains models of old and newly invented machines and tools, together with illustrative specimens of mechanical and chemical products, and of natural materials within the domain of industrial processes. In the museum of artillery is a large collection of the instruments invented by men of all ages for their mutual destruction, from stone hatchets to rifled cannon. The mineralogy of France, geographically arranged by her departments, is exhibited at the school of mines. The numismatic museum at the mint displays the coins and medals struck in France from the time of Charlemagne to the present. The museum at the national printing house offers samples of early and modern printing in curious variety, of which not the least noteworthy are the productions of its own press, such as the Lord's Prayer in 150 different languages, and copies of *L'Imitation de Christ* that approach the perfection of typography. The museum of the Louvre, worthily occupying the wide spaces of that magnificent palace, is divided into twelve general departments, such as of painting, designs and engravings, ancient sculpture, modern sculpture, Assyrian antiquities, Egyptian antiquities, &c., to which are added large collections of rare and exquisite specimens of ceramic art, of carved work in wood and ivory, crystals, jewels, &c. Other European galleries are richer in the works of certain masters and of single schools, but none of them offers to the student so comprehensively instructive a view of all the schools. The museum of the Luxembourg, filling but a small part of the palace of that name, though a fine and most interesting collection of works by contemporary French painters and sculptors, is not nearly sufficient as an exemplification of the present French school. The conditions of admission to these museums are most liberal. Those of the Louvre and of the Luxembourg are freely open to all comers six days, and to copyists five days in the week. Of the painters, designers, sculptors, and engravers whose works are admitted to the yearly *salon* or exhibition of fine arts, the average for the past ten years of Parisian residents is about 1,200. It is hardly necessary to add, in view of the conditions of admission, that this number represents but a fraction of the applicants, and that in no one year do nearly all resident artists apply.—Paris may be called the capital of dramatic art and literature. The first theatre of Paris, not to say of the world, is the Comédie Française, the French theatre *par excellence*. It was founded in 1680 by the company that had been directed by Molière. There elocution, gesture, attitude, costume, composition of stage groups, and whatever contributes to the perfection of histrionic art, are exhibited in unrivalled completeness. The national academy of music, or Opéra, is famed for its orchestra, ballet, and scenic effects. These two are regarded as properly national institutions, and are sustained at their height of superiority by large government aid, which in less proportions is also granted to three other theatres. There are 38 theatres in Paris. On the receipts of theatres, balls, concerts, and all other places of public amusement, a tax, nominally of 10 per cent., but really in recent years of about 8 per cent., is levied for the benefit of the public charities. In 1869, an average year, their receipts amounted to 19,500,000 francs, and the poor tax to 1,800,000. In round numbers the theatres can seat 30,000 auditors, for whose entertainment 850 musicians and 2,000 actors proper, vocalists, and other performers are employed. For the principal journals of Paris, see Newspapers.—The government of Paris has varied in its character with the changes of national régime. At present (1875) there is a municipal council of 80 members chosen by popular election, whose deliberations and acts are strictly limited to matters of local administration. The prefects of the Seine and of the police, both appointed by the general government, have the right at all times to be present and be heard, in certain cases with controlling voice, at their meetings. Sanitary regulations and measures for keeping the peace and political order are enforced under the general supervision of the prefect of police. Besides exercising functions of a wider national reach, he is the immediate chief of all the local police. This consists, besides special political and other agents, of the civil police proper or "guardians of the public peace" (formerly *sergents de ville*), now numbering about 6,000; of the two legions of the military *garde républicaine* (formerly municipal guard and guard of Paris), numbering 6,000 foot and 1,500 horse; and of the military corps of *sapeurs pompiers*, specially trained to firemen's duty, which they perform admirably, numbering about 1,300 men and officers. Supplementary to these as preservers of order is the garrison of Paris, the strength of which varies according to circumstances. Not being yet relieved from the state of siege in which it was decreed to be soon after the declaration of the late war, the city has in addition to the officials above mentioned a military governor.—Paris is the financial and commercial centre of France; and its importance in this respect, in a country so centralized, is not exceeded by that of any capital, unless perhaps by London. Here are the bank of France, which has branches in the departments and in Algiers, and has the exclusive privilege of issuing bank notes in France; the other principal financial institutions of the country; and the administrations of the five great railways, which with their numerous branches cover France with a network of iron. In 1867 (a somewhat exceptional year) there were 31,308 arrivals of canal boats and other vessels at Paris, gauging an aggregate of 3,689,881 tons, or as much as the tonnage of the five principal seaports of France. All edibles, potables, and combustibles, building materials, and some other classes of merchandise, pay on entering the city an *octroi* or customs duty, which is collected at an expense of less than 5 per cent. of the total receipts. The city budget for 1873 presents the following among other figures: Receipts, 197,815,582 francs; expenditures, 197,080,082. The chief item of receipts is *octroi*, 102,286,000 francs. The principal expenditures were: interest on debt and sinking fund, 46,170,825; cost of tax collecting, salaries, &c., 8,420,000; primary schools, 5,966,000; public assistance (charities), 22,346,000; promenades and works of art, 3,267,000; repairs of public buildings, 1,703,000; new public works, 24,512,000; prefecture of police, 15,462,000; lighting streets, 3,917,000. The latest trustworthy statistics of the industrial condition of Paris are those obtained by the inquiry instituted by the chamber of commerce in 1860. Between that time and 1870 there was an increasing activity; but this again received a check by the war and the commune, from which in some departments of business, especially in that of building and its connected group of trades, it is slow to recover; meantime the rate of wages has followed at an interval the rise in the cost of living. The following table of the principal trades arranged by groups is still worth regarding:

INDUSTRIES CONNECTED WITH	No. of establishments.	No. of hands.	Value in francs of yearly production.
Food	29,069	38,859	1,087,904,867
Building	5,878	71,242	815,266,477
Furniture	7,891	37,951	199,825,948
Clothing	23,800	78,377	454,588,168
Spinning and weaving	2,836	26,810	119,998,751
Ordinary metals	3,440	28,866	163,852,428
Precious metals	3,199	18,731	183,390,558
Chemicals and ceramics	2,719	14,397	193,616,849
Printing, engrav'g, paper, &c.	2,759	19,507	94,166,528
Clocks and watchwork, musical, mathematical, and other "instruments of precision"	20,580	82,071	66,040,288
Furs and leather			100,881,795
Carriages and saddlery			93,849,195
Cooperage			27,075,823
Fancy articles (*articles de Paris*)			127,546,540
Sundry, ungrouped			141,140,294
Total	101,171	416,811	3,369,092,949

Of the 416,811 hands employed, 285,862 were men, 105,410 women over 16 years of age, 19,059 boys, and 6,481 girls. Of the men, 1,588 earned less than 1 franc daily, 18,266 from 1 to 2 francs, 44,226 from 2 to 3, 82,337 from 3 to 4, 98,527 from 4 to 5, 30,757 from 5 to 6, 14,186 from 6 to 10; 221 earned .11 francs; 380, 12; 216, 15; and 57, 20. Of the women, 17,203 earned less than 1¼ francs, 49,176 from 1¼ to 2, 35,239 from 2 to 3, 3,925 from 3 to 4, and 767 from 4 to 10. The value of exports from Paris to foreign countries in 1861 was 347,349,098 francs. The chief receiving countries were: the United States, 81,024,729 fr.; Great Britain, 34,750,393; Russia, 23,119,924; Spain, 17,763,921; Switzerland, 13,409,138; Italy, 12,613,720; Germany (exclusive of Prussia and Austria), 9,032,930; Belgium, 6,630,484; all other countries, 13,942,230. The exports from Paris to the United States have of late increased very rapidly. For several recent years their amount has been as follows: 1864, $16,469,000; 1865, $27,824,000; 1866, $36,123,000; 1867, $29,998,000; 1868, $26,295,000; 1869, $30,103,000; 1870, $26,696,000; 1871, $25,975,000; 1872, $38,680,000. Paris is celebrated for its jewelry and other goldsmith's work, watches and ornamental bronzes; its boots, shoes, and gloves; its pianofortes, paper hangings, perfumery, artificial flowers, articles of female dress, and military equipments. Its mathematical, optical, and surgical instruments have a deservedly wide reputation for beauty and accuracy. The products of the Gobelins manufactory of tapestry and carpets do not enter into commerce. The manufactory belongs to government, and like the porcelain factory at Sèvres is not a rival of, but a beneficial model and pioneer experimenter for private enterprises. The government tobacco factory in Paris furnishes about one fifth of the snuff, cigars, and smoking tobacco consumed in France. Among the most interesting establishments organized and directly controlled by the municipal administration are the great central markets (*halles centrales*), consisting of 12 great *pavillons* or halls of iron and glass, covering a space of 87,790 square metres, and divided into stalls, &c., somewhat in the manner of our own markets. Each pavilion is devoted to the sale of some special class of provisions, and all are connected and traversed by passages and streets, all under cover, the whole forming as it were a small covered city. The *halles* are at the S. E. end of the rue Montmartre, near the boulevard de Sébastopol. Underneath the pavilions are great vaults, where there are tanks for live fish, storage places for vegetables, &c. These vaults are connected with the railway termini by underground railways, by which the provisions arrive at the markets, and the garbage and refuse are carried away. The following statistics of the sale of articles of food at these markets during 1874 are interesting as affording some means of judging of the city's consumption, as they supply the greater part of the capital. At the pavilion specially reserved for the sale of meat more than 15,400,000 lbs. of beef, 8,800,000 of mutton, 19,800,000 of veal, and 5,500,000 of pork, forming in all a total of nearly 27,000 tons, were disposed of; while for poultry and game the figures are: chickens and capons, 3,226,885; rabbits, 1,281,017; pigeons, 1,593,347; larks, 1,774,628; hares, 161,103; partridges, 405,281; deer, 7,014. The number of eggs sold reached the total of 213,500,000, and the weight of fresh and salt butter is estimated at 11,000 tons. The sale of fish has increased immensely within 25 years, for while only 138,600 lbs. were brought to the central markets in 1850, the total for 1874 is 50,600,000, an eighth of which was made up of fresh-water fish. The octroi duty upon oysters has risen from 800 francs in 1848 to 12,000, the tax paid upon the 12,000,000 oysters consumed by the Parisians in 1874. The vegetables and fruit disposed of weighed more than 6,000 tons.—The earliest historic mention of Paris is by Julius Cæsar. On an island in the Seine he found a town of huts, the stronghold of one of the 64 confederate Gallic tribes. Much ingenious conjecture has failed to clear away the obscurity that involves the etymology of its name Lutetia, and the origin of its inhabitants, the Parisii. The former may be a Latinized corruption of three Celtic words, *luth*, *thoneze*, *y*, or of two, *louton hesi*, signifying a dwelling in the waters; and the latter are supposed to be an offshoot of the Belgæ. They were a fierce race of hunters and warriors. They burned their town rather than yield it to invaders in 52 B. C. When physical resistance was finally overcome, they were slow to accept Roman laws and customs. The local genius was early manifest in opposition to imposed authority. An insurrection broke out in A. D. 286, the two leaders of which, upborne on shields, were proclaimed emperors by the people assembled near the present site of the hôtel de ville. Between 358 and 360 the future emperor Julian, who retired here to winter quarters, and in the *Misopogon* has recorded his affection for "dear Lutetia," confirmed old rights and granted new privileges to the town, which rose to the dignity of a city and took the name of Parisii. For centuries it was the residence of a Roman prefect. Its commerce, at first principally carried on by the river, was in the hands of a trading company, the *Nautæ Parisiaci*, which, existing as early as the reign of Tiberius, long outlived the Roman domination, contained the germs of the future municipal government, and has left in the city arms of to-day its symbolic mark, a galley with oars and sails, and the motto *Fluctuat nec mergitur*. The *palais des thermes*, some remains of which are still to be seen, was occupied by several Roman emperors, who made Paris their headquarters while their legions were striving to repel the irruptions of the barbarians. As the vitality of the overgrown empire grew faint and fainter in its extreme members, Paris suffered greatly from these irruptions. In 451 it was saved from Attila's invasion only by the courage and wisdom of St. Geneviève, and in 464 was stormed by Childeric I., king of the Franks. His son Clovis made Paris his residence, embraced Christianity, and built a church dedicated to St. Peter and St. Paul, which was afterward placed under the invocation of his wife's friend St. Geneviève, who died in his reign, and remains to this day the patron saint of the city. He broke the last weakened bonds of Roman domination, and Paris became independently Frank. While under his feeble successors of the Merovingian dynasty Roman civilization was fading away, the church rose to wealth and power. According to the legend, Christianity was first preached in Paris in the middle of the 3d century by St. Denis, to the place and manner of whose death some writers attribute the origin of the name of Montmartre, which other etymologists deduce from a heathen temple of Mars that once stood on that hill. A chapel dedicated to the true God and St. Stephen was erected in the reign of Valentinian I., on the site of an earlier altar to Jupiter now covered by the cathedral of Notre Dame. The Carlovingian monarchs, like their predecessors of the Merovingian line, rarely inhabited Paris. Doubtful legend and conjecture ascribe to Charlemagne the merit of originating the university of Paris. The Normans repeatedly attacked the city in the 9th century. The Parisians finally appealed for aid to Eudes or Otto, count of Paris, whom, after he had repelled the invaders, they proclaimed king in 885. His successor 100 years later, of his blood but not his direct heir, was Hugues or Hugh Capet, the first king of France properly so called, from whom directly or indirectly descended all French monarchs down to Louis XVI. Paris now increased in honors, privileges, wealth, influence, and population. Her schools, illustrated by such teachers as Peter Lombard and Abélard, were resorted to by the youth of all Europe. The powerful order of the templars erected a fortress on the ground where the Marché du Temple, with its 2,000 dealers in old clothes and in every other conceivable second-hand article of economy—one of the most curious of the curiosities of modern Paris—now stands. The foundations of the cathedral of Notre Dame were laid. Philip Augustus (1180–1223) recognized the university as a corporation, and granted to its officers a jurisdiction independent of the royal courts, over the quarter of the city to which it gave its name. He caused a new wall to be built about the town enclosing 625 acres; by a formal act he gave all the refuse straw of the royal apartments for the benefit of the patients of the Maison-Dieu; he established two covered markets, and even ordered pavements for the streets. Louis IX. greatly promoted the welfare of Paris by important reforms of customs, laws, and police, and by establishing many commercial, religious, and beneficent institutions, among which last were a hospital for the blind and a school of surgery. His chaplain, Robert de Sorbon, founded in 1250 a school of theology, the origin of the famous Sorbonne, in the quarter of the university still known as the quartier Latin or Pays Latin. While King John, taken prisoner by the Black Prince, was held captive in England, the city was governed for a time by Étienne Marcel, the provost of the merchants, independently of the general state. For centuries before as for centuries after the brief reign of this popular leader, Paris was often disturbed by insurrections and popular tumults, and fierce quarrels between great lords and the king, or among themselves, with bloody fights and judicial massacres; its streets, despite royal reforms and new regulations of police in frequent succession, were until modern times unsafe for honest citizens after nightfall. Under Philip IV. there were brilliant public fêtes, for which Paris seems thus early to have been distinguished, and "mysteries" were performed on stages set up in the open air, the first dramatic representations in Paris. Charles V. built a new palace, then called the hostel de St. Pol, afterward famous in history, with change of destination and name, as the Bastile. (See Bastile.) The basement only of most private houses in those days was of stone; on this rested one or more stories of timber filled between with mortar; when the proprietor's wealth permitted, the façade was covered with slates, and the projecting cornices and corner posts were adorned with carvings, representing foliage, fantastic animals, the heads of angels, and Biblical personages. Chariots and even four-wheeled carriages, and disorders of swelling luxury, excess of gambling among the rest, are spoken of in contemporary documents. The city had overgrown its old limits, and the monarch caused a new fortified wall to be built, enclosing now 1,084 acres, to protect it against the incursions of the English; who, however, at the end of the reign of his insane successor, marked in the annals of the city by pest, famine, and all the horrors of bloody faction, entered Paris amid *Te Deum* chants and great fêtes, and proclaimed Henry of Lancaster king of France and England. The enthusiasm of the occasion was only surpassed by that which greeted the entrance of Charles VII. after the expulsion of the English in 1436. About this date Greek was first taught in the university, which then numbered 25,000 students. In 1438 there were 5,000 deaths at the Hôtel-Dieu, and in all the city 45,000; wolves prowled through its streets, desolated by war, plague, and famine. In 1466 malefactors and vagabonds of all countries were invited to fill up the broken ranks of its population, which numbered 300,000 souls before 1483, the close of the reign of Louis XI. This astute ruler favored trade and commerce of all kinds, protected against violent opposition the new art of printing and its connected industries, confirmed the privileges of the citizens, endowed the capital with its first special school of medicine, favored the first attempt at lighting its streets, and inaugurated the first rude postal system, putting it in communication with all parts of France. Under Francis I. (1515-'47) the advance of Paris in material prosperity, in arts and letters, in the refinements and in the vices of civilization, received a fresh impulse. The castle of the Louvre, begun by Dagobert and repeatedly enlarged and strengthened by succeeding monarchs, was swept away, and the palace of the old Louvre begun upon its site; the hôtel de ville was commenced, new streets were opened, old quarters rebuilt, and a royal free college founded. The origin of the château and gardens of the Tuileries, the endowment of the college of Ste. Barbe, now one of the first high schools of Paris, and the effective constitution of what is now the national library, date from the reign of Henry II., in despite of whom a Protestant church also was established. The disasters of the so-called wars of religion, culminating in the horrors of the St. Bartholomew massacre, fell heavily upon Paris, barring its progress in all directions. It revived under the rule of Henry IV., whose accession it had desperately resisted. The palaces of the Tuileries and the Louvre were greatly enlarged, the place Royale formed, and the pont Neuf built. Under the reign of Louis XIII., or rather of his minister Richelieu, the Palais Cardinal, now Palais Royal, was begun. The Luxembourg palace, several fine quays and bridges, and numerous magnificent private hotels in the faubourg St. Germain, date from this period; as do also the French academy, the *jardin des plantes*, and the college that afterward took the name of Louis-le-Grand. More than 80 new streets were laid out and many of the old ones improved in the long reign of Louis XIV., from which date also the academies, with the exception of the French academy, the observatory, the opera, and the Comédie Française, the Hôtel des Invalides, the eastern colonnade of the Louvre, the triumphal arches of St. Denis and St. Martin built on the site of ancient city gates, the laying out of the boulevards as promenades, the planting of the Champs Élysées, the enlargement of the Tuileries and the arrangement of its gardens nearly as they now are, the forming of the place Vendôme and the place des Victoires, 38 churches, a foundling hospital, the hospice of the Salpêtrière, the Gobelins tapestry manufactory, the first city post, the lighting of the thoroughfares with "lanterns placed from distance to distance" (which was commemorated by a medal bearing the legend, *Urbis securitas et nitor*), the rudiments of the modern omnibus (an unsuccessful invention of Blaise Pascal, in the shape of seven coaches in which "even women took their places," for five sous, but from which soldiers and all persons in livery were excluded), and finally, to close the imperfect catalogue of innovations, the first coffee house in Paris. At the accession of Louis XV. Paris occupied a space of 2,809 acres, and counted 500 grand thoroughfares, 9 faubourgs, 100 squares and open places, 9 bridges, 22,000 private houses, of which 4,000 had carriage entrances (*portes-cochères*), and more than 500,000 inhabitants. It was the capital of science, art, literature, taste, and pleasure, not only for France but for Europe. During this reign the growth of the city went on in all ways. In the following reign, the duke of Orleans, better known in history as Philippe Égalité, enclosed the spacious gardens of the Palais Royal with a continuous quadrangle of uniform architecture, whose galleries, furnished with shops of every kind, and coffee rooms, gambling rooms, and wine rooms, became one brilliant bazaar. The famous orgies of the regency in the palace proper were followed by revolutionary orgies in its gardens. It was, up to the first quarter of the present century, the central stage and sink of what was brightest and foulest in Paris. In 1784 the farmers general of the city customs erected about the enlarged city an *octroi* or customs wall, enclosing an area of 8,708 acres, containing more than 50,000 houses, 967 lighted streets, 46 parish and 20 other churches, 11 abbeys, 133 monasteries and religious houses, 15 seminaries, 10 colleges, 26 hospitals and asylums, 60 fountains, and 12 markets. This octroi wall formed the city boundary till Jan. 1, 1860. In the first years of the revolution many monuments of the middle ages were demolished or mutilated; the fine arts generally were neglected in the fierce struggle about more essential things; material growth was checked and the population diminished. But the ground was cleared for future improvements, and many of the institutions of which Paris to-day has best reason to boast date their origin from the revolutionary period; such are the museums of the Louvre, the bureau of longitudes, the conservatory of arts and trades, the polytechnic school, and the national industrial exhibitions held in Paris. In the political order, the revolution finally crowned a work at which the ablest monarchs and statesmen of France had for centuries been more or less consciously laboring. It swiftly swept away the last obstacle to the completing of an administrative system which, centralized at Paris, extends its sovereign control to the remotest corner of the land, vivifying and strengthening perhaps the nation by unity of impulse, but crippling the power and weakening the spirit of individual action in equal proportion, and unduly subordinating the country at large to metropolitan influence. Napoleon I. expended more than 100,000,000 francs, when money for such purposes was of far greater productive value than at present, on works of public utility and ornament, but left some of the grander of them to be finished by his successors. Under the restoration and Louis Philippe private enterprise, encouraged by peace, vied with the government in enlarging and adorning the city. An improved civil police, better drainage, paving and lighting of the streets, with increased attention to comfort and decency in domestic architecture, mark this period. During its latter part, too, the present fortifications were constructed, and the whole arrangement for the defence of Paris was thus placed upon an entirely different footing from the comparatively unprotected condition of the past. The city's material prosperity seemed but transiently dimmed at the close of the reign of Louis Philippe, though the immediate effect of the revolution of 1848 was a check upon it. But a visitation of the cholera and the insurrection of June furnished to the republican government early suggestions of the need and nature of certain changes afterward embraced in the general system of transformation carried nearly to completion under the second empire. The republic was suppressed by the *coup d'état* of Dec. 2, 1851. Its name was abolished a year later, when Louis Napoleon "closed the era of revolution," and had himself named emperor. Almost the only French monarch born and residing throughout his reign in Paris, he aimed to make of his birthplace the most salubrious, convenient, and sumptuous city of Europe, a monument of his reign and a fortress for his dynasty. The public works of this period cost the city and national treasury, exclusive of certain special appropriations, from 1852 to 1859, an average of about $2,800,000 per annum, and for the next decade about $8,600,000. In the last year of the empire it is known to have surpassed the estimates. One of the early acts of Napoleon III. was to order that to be done which Louis XIV. had contemplated, Napoleon I. had labored at, Louis Philippe had talked of, and the provisional government had decreed, namely, the clearing away of the intervening huddle of old houses and the connecting of the Louvre with the Tuileries. While this work of demolition and monumental construction was in progress, the palace of industry and the palatial central markets were built; the rue de Rivoli was extended for miles through a labyrinth of dark streets; much of the present great system of sewers was constructed; a great number of new streets, parks, places, &c., were laid out; and a large majority of those works mentioned in the earlier part of this article, as contributing to the present beauty and convenience of the city, were planned and executed. Meantime the efforts of individual and associated private capital, credit, and feverish speculation kept pace with their imperial progress. Of all the houses of Paris in 1870, less than one third had been built prior to 1852. The returning visitor might traverse broad thoroughfares for miles together, and, except for here and there a glimpse of a spared monument, hardly meet with a reminder of the places he knew 25 years before. Little remains of what was then still left of old Paris: its crooked streets, close and dark, with their quaint gables, and storied fronts and corner towerets, so rich in historical associations and foul flavors, so picturesque, so favorable to popular *émeutes* and epidemic maladies. In 1860 the octroi wall was demolished, and the suburban towns and villages grouped around it were annexed to Paris, which took for its boundary the fortifications. The prosperity of Paris seemed at its height; the luxury of its shops, promenades, theatres, saloons, and court outshone those of all other European capitals; the general government, of which the city administration was a branch, was deemed by throngs of admiring strangers perfection in its solidity as in other respects, when the declaration of war in July, 1870, suddenly changed the aspect of affairs. On Sept. 4 the empire fell without a drop of blood shed in its defence by its late beneficiaries. The alarmed empress fled to England; and the rapid progress of the war (see France) soon brought the advancing German army within a short distance of the city, where the most energetic measures were in progress for defence. On Sept. 19 a sortie under Gen. Ducrot proved fruitless as a means of hindering the advance, and his troops were driven back. In the two weeks following, the investment of Paris by the German armies was made complete. The forces of the besieged at the time of the investment were, according to the *Journal Officiel*, as follows: the 13th and 14th corps of the line, in round numbers 50,000 men, under Gens. Vinoy and Renault; a corps of government and railway employees and volunteers, and a body of cavalry, in all about 30,000, under Ducrot; 100,000 men of the *garde mobile* and 10,000 marines, under various commanders; 60 old and 194 new battalions of the national guard; grand total, about 400,000 men. Gen. Trochu, president of the government of the national defence, was commandant of the city. The forces of the besiegers, and their arrangement about the city, were as follows: the "third army" (5th, 6th, and 11th Prussian corps, two Bavarian and two Würtemberg corps), under the crown prince of Prussia, embraced the S. and S. E. front from Sèvres to the Marne; and the "army of the Meuse" (12th Saxon and two Prussian corps), under the crown prince (now king) of Saxony, embraced the N. and N. E. front; the whole besieging force numbering about 220,000 men. On Sept. 20 the Prussian crown prince, and on Oct. 5 the king, took up their headquarters at Versailles; those of the Saxon crown prince were at Grand Tremblay. From Sept. 20 the lines of the Germans were constantly drawn more and more closely about Paris, and the siege from their side presents little more than the regular progress of military operations, hardly interrupted until their successful end. Its history from the side of the besieged, however, is entirely different. Every expedient for breaking the lines of the besiegers was debated; and desperate but unsuccessful sorties were made on Sept. 30 (Gen. Vinoy with 10,000 men in the direction of Choisy), Oct. 13 (reconnoissance under Trochu toward Châtillon), Oct. 21 (Gens. Noël and others toward Bougival, Malmaison, &c.), Oct. 28 (the French capturing Le Bourget, which was recaptured after a violent conflict on the 30th), Nov. 29 and 30 (fighting at Mont-Mesly, Champigny, Villiers, and Brie, all of which were taken by the French and retaken by the Germans within a few days), and Dec. 21 (Trochu toward Le Bourget). On Dec. 27, at 7½ A. M., the Germans, who had finally decided upon and prepared for this measure, began a vigorous bombardment of the city, directing it first of all against the forts on the E. side, the fire of which was practically silenced by Jan. 1. On the 5th of that month the bombardment of the southern forts was begun, and on that day, too, the first shells fell in the city itself, in the Luxembourg gardens. On the 13th, 14th, and 15th the French made further unsuccessful sorties in various directions; and on the 19th Trochu once more undertook a grand sally from Mont Valérien and that side of the city, against the German left wing, with more than 100,000 men. An obstinate conflict followed, but the French were finally driven back with heavy loss. All hope of saving the city was now over; on the 20th Trochu resigned the governorship; and on the evening of the 23d Jules Favre appeared at Versailles to begin negotiations for the capitulation. The terms of the surrender, and the account of the German entry and subsequent events connected with it, are given in the article France; and the account of the great communistic insurrection, in which the whole history of the city until the beginning of June is involved, is given in Commune de Paris. The suffering in the city during the two sieges was very great, that of the majority of the people being far greater during the German than during the Versaillist investment. At the moment of the former investment its population was in excess of 2,000,000, the depletion by the voluntary and forced withdrawal of many thousands of its ordinary French and foreign inhabitants being more than compensated by the influx of refugees from the neighboring region. The military conduct of the defence is still too much matter of grave and often of passionate discussion to be authoritatively pronounced upon here. What is indisputable is, that despite a bombardment of three weeks, which was constantly increasing in intensity, Paris finally capitulated to cold and hunger. The winter was unusually severe. In the latter period of the siege the daily rations, purchasable of butchers and bakers only on presentation of a personal certificate, were for an adult about two ounces of horse flesh and less than three-quarters of a pound of bread composed of one part wheat and two parts of whatever else could be got. There was no fixed scale of prices for other articles in the desolate markets; but the following "quotations" in francs for the third week in January, rather moderate than exaggerated, are historically accurate: a chicken, 40 francs; a rabbit, 50; a good onion, ½, very fine, 1; a turkey, 150; a goose, 140; a cat, 12 to 18; dog, 3½ a pound. Rat, cat, and dog butcher shops were not uncommon. Elephant, while it lasted, was 40 francs a pound for choice pieces. Wood, green and very scarce, cost from 7 to 10 francs the 100 lbs.; charcoal was nearly and stone coal quite unobtainable. All that kept these prices from rising still higher was, that they were already out of reach of the empty or thin purses of the larger part of the two millions. The number of deaths during the 19 weeks of investment and the four weeks next following, *i. e.*, from Sept. 18, 1870, to Feb. 24, 1871, was 64,154. The number of deaths in the corresponding period of the preceding twelvemonth was 21,978. The highest weekly bill of mortality was 4,761. A partial communication with the outer world was maintained by balloons and carrier pigeons. Of 62 postal balloons sent out, bearing in all 159 persons and 18,000 lbs. of written and printed matter, only seven fell into the hands of the enemy, two are supposed to have been borne out by wind currents and lost at sea, and one landed in Norway. The return post by carrier pigeons, consisting of brief despatches microscopically reduced by photographic process, was scanty and precarious. Of 85 post-office messengers attempting to pass the lines, only eight succeeded in getting out, and only three in entering. There was one fortnight in which no news of any description reached the city from without. (See AËRONAUTICS.) Among the public buildings burned during the commune insurrection were the prefecture of police, *grenier d'abondance*, ministry of finances, hôtel de ville, the palaces of the council of state, Tuileries, and legion of honor, and the Palais Royal. The last two have been restored. The column of the place Vendôme, which was thrown down just before the week of blood, has been reconstructed. Several public libraries, of which the most important were those of the Louvre and of the hôtel de ville, and many valuable works of art, were also burned. The insurrection of March, following on the revolution of September, confirmed a majority of the national assembly in their fear of Paris, which, after being the seat of every successively sitting and unseated government, from that of Louis XVI. to that of Louis Napoleon, is now (by the constitutional enactments of February, 1875) legally decapitalized in favor of Versailles, where the national assembly has held its sessions and the chief of state has had his ordinary official residence since the peace with the Germans. The ministries, however, remain in Paris, and the administrative machinery which controls the affairs of the country is still worked from its old centre. In 1873 the municipal authorities resolved to undertake several great schemes of improvement and public works, for which 7,000,000 francs were appropriated in June of that year, and large sums have since been added. These designs involve the lengthening of many of the present important avenues and streets, and the laying out of a large number of new ones; the rebuilding of the Tuileries, hôtel de ville, and other edifices; improvements in the fortifications, &c. Most of these works are now in progress. The principal recent event in connection with the great edifices of Paris has been the opening of the grand opera house, which took place with much ceremony and success on Jan. 5, 1875.

PARIS, also called ALEXANDER, a Trojan prince, second son of Priam and Hecuba. His mother having dreamed during pregnancy that she brought forth a flaming torch which set fire to the city, he was immediately after his birth exposed on Mt. Ida, where a she bear suckled him for five days. A shepherd then took him home and brought him up as his own child. He grew up handsome, accomplished, and valiant, and when a dispute arose between Juno, Minerva, and Venus for the golden apple inscribed "To the fairest," which Eris (Strife) threw among the assembled divinities, Paris was selected by Jupiter to decide the quarrel. He awarded the prize of beauty to Venus, who promised him in return the fairest of women for his wife. Afterward the secret of his parentage was declared by his sister, the prophetess Cassandra, and he was received by Priam as his son. Hearing of the surpassing charms of Helen, the wife of Menelaus, king of Sparta, he sailed to Greece with a fleet, and, aided by Venus, carried her off to Troy. This led to the siege of Troy, in which Paris showed little of his accustomed courage, but he twice met Menelaus in conflict; once he fled, and again he was defeated, but was borne away by Venus. According to one account he killed Achilles. Being wounded by Phyloctetes with an arrow of Hercules, Paris repaired to his long deserted wife Œnone, whom he had married before the abduction of Helen; but she refused to heal him, and he returned to Troy. Œnone repented and followed him with remedies, but being too late killed herself in despair.

PARIS, Alexis Paulin, a French author, born at Avenay, department of Marne, March 25, 1800. He early went to Paris, translated Byron's works and Moore's memoirs (15 vols., 1827–'32), was employed in the royal library, of which he became one of the directors, and was elected to the academy of inscriptions and belles-lettres. A chair of mediæval philology and literature was established for him at the collége de France in 1853. He has edited *Les grandes chroniques de St. Denis* (6 vols., 1836–'8), *Historiettes de Tallemant des Réaux* (in conjunction with Monmerqué, 9 vols., 3d ed., 1860), *Les romans de la table ronde* (1868 *et seq.*), and other works. He is a member of the commission to continue the *Histoire litté-*

raire de France.—His son Gaston has published several works on the French grammar, and received the Gobert prize for his *Histoire poétique de Charlemagne* (1866).

PARIS, John Ayrton, an English physician, born in Cambridge, Aug. 7, 1785, died in London, Dec. 24, 1856. He graduated M. D. at Caius college, Cambridge, in 1808, and in the same year engaged in the practice of his profession in London. Soon afterward he settled in Penzance, Cornwall, and while there founded the royal geological society of Cornwall. In 1817 he returned to London, and delivered lectures on the materia medica and the philosophy of medicine, the matter of which was reproduced in his "Pharmacologia" (8vo, 1819; 9th ed., rewritten, 1843). In 1844 he became president of the London college of physicians, which post he retained until his death. He published a memoir of Sir Humphry Davy (4to, 1810); a "Treatise on Diet" (8vo, 1826); "Philosophy in Sport made Science in Earnest;" and in conjunction with J. S. M. Fonblanque, "Medical Jurisprudence" (3 vols. 8vo, 1823). He invented the "tamping bar," an iron implement coated with copper, which protected miners from the sparks evoked by the ordinary iron bar.

PARIS, Louis Philippe d'Orléans, count de, a French prince, eldest son of the duke of Orleans, and grandson of Louis Philippe, born in Paris, Aug. 24, 1838. He was educated under the direction of Regnier in Paris, and after the revolution of 1848 in Eisenach, and subsequently in England. He travelled extensively, and in 1860 visited the East together with his brother the duke de Chartres, who also accompanied him in 1861 to the United States. He served on the staff of Gen. McClellan from November, 1861, till after his retreat to the James river in the summer of 1862, when he returned to England chiefly because of the possibility of complications between the United States and France in regard to Mexico, having received the warmest commendations for courage and military capacity. In 1864 he married his cousin, a daughter of the duke de Montpensier, who has borne him several children. In 1870–'71 the count and countess were very active in London and afterward in Paris for the relief of French soldiers during the war. A sum of £500 was sent from New York to the countess for this purpose, contributed by persons who desired by this means to attest their regard for the count's services to the Union; and a considerable amount from other American contributors was placed at the count's disposal for distribution. At the close of the war with Germany he took up his residence in Paris. He visited the count de Chambord at Frohsdorf in 1873, and was reported to have relinquished his claims to the throne for the present in favor of the latter, on condition of being recognized as the sole heir after Chambord's death to the regal rights of both branches of the Bourbons. He has published *Damas et le Liban* (London, 1861); *Les associations ouvrières en Angleterre* (in French and English, 1869); and *Histoire de la guerre civile aux États-Unis* (4 vols., Paris, 1874-'5; authorized English translation to be made by Louis F. Tasistro).

PARIS, Matthew. See Matthew Paris.

PARIS, Plaster of. See Gypsum.

PARISH (law Latin, *parochia*). In English ecclesiastical law, this word has always meant a certain extent of territory, or "circuit of ground," committed to the spiritual charge of one parson, or vicar, or other ecclesiastic. All England is divided into parishes, and they number about 10,000. Camden says parishes began in England about the year 630. Sir Henry Hobart refers them to the council of Lateran in 1179. Selden places their origin between these periods. It seems, however, that about 1,000 years ago, while every man was bound to pay tithes to the church, he paid them to whatever ecclesiastical division of the church he preferred; but a law of King Edgar, about 970, seems to confine the payment to the parish to which the man belonged, and so it has remained ever since.—In the United States the word parish is of frequent use, but it does not mean precisely the same thing as in England, nor does it mean the same thing in all the states. The legal importance of parishes in England depends upon the fact that the rector of each parish is entitled to the tithes of agricultural produce within it, except so far as some qualification of this rule has been made by comparatively recent statutes. In this country tithes were never paid, or rather no legal obligation to pay them ever existed. But from the first settlement of the country we have had everywhere associations and bodies corporate or organized for ecclesiastical purposes, and these have been generally called parishes. In New England they were originally the same as towns; that is, the persons composing a town, and acting as a town in civil and political matters, also acted as one body in religious or ecclesiastical matters; and the parish had therefore the same territorial limits as the town. As the towns grew more populous, they were divided for ecclesiastical purposes into different parishes, which were still territorial and were contained within local limits. At length, as a diversity of religious sentiment became developed, all religious opinions standing on the same footing in law, parishes began to be formed of persons associated by similarity of religious sentiment and not mere nearness of residence, and therefore with little or no reference to their place of abode. These were called poll parishes, in distinction from territorial parishes.—In Louisiana, the word parish is used to designate what in the other states is called a county.

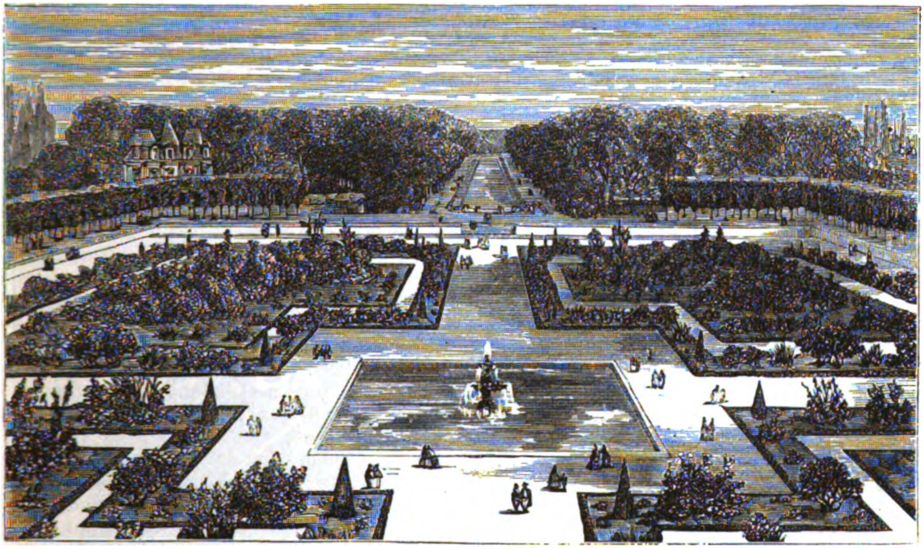
PARISH, Elijah, an American author, born at Lebanon, Conn., Nov. 7, 1762, died at Byfield, Mass., Oct. 15, 1825. He graduated at Dartmouth college in 1785, studied theology, and in

December, 1787, settled as pastor of the Congregational church at Byfield. He belonged to the party called in his day the Hopkinsian. In 1810 he preached the annual election sermon, in which he so bitterly inveighed against the policy of the government, that the legislature refused to ask it for publication; it had nevertheless a large circulation. He published a "Gazetteer of the Eastern and Western Continents," in conjunction with the Rev. Dr. Morse (1802); a "History of New England" (1809); "System of Modern Geography" (1810); "Memoir of the Rev. Dr. Eleazar Wheelock, First President of Dartmouth College," in conjunction with the Rev. Daniel McClure (1811); and "Sacred Geography, or Gazetteer of the Bible" (1818). A volume of his sermons, with a memoir, appeared in 1826.

PARK, a space of ground used for public or private recreation, differing from a garden in its spaciousness and the broad, simple, and natural character of its scenery, and from a "wood" in the more scattered arrangement of its trees and greater expanse of its glades and consequently of its landscapes. For the sake of completeness, recreation grounds not properly called parks will be considered under the same title. The grounds of an old English manorial seat are usually divided into two parts, one enclosed within the other and separated from it by some form of fence. The interior part, immediately around the dwelling, is distinguished as the pleasure ground or kept ground, the outer as the park. The park is commonly left open to the public, and frequently the public have certain legal rights in it, especially rights of way. A parish church is sometimes situated within the park. The use of the park as part of a private property is to put the possibilities of disagreeable neighborhood at a distance from the house and the more domestic grounds, to supply a pleasant place of escape from the confinement and orderliness of the more artificial parts of the establishment, and for prolonged and vigorous out-of-door exercise. The kept grounds, being used incidentally to in-door occupations, are designed in close adaptation to the plan of the house, richly decorated, and nicely, often exquisitely, ordered by the constant labor of gardeners. Anciently the kept grounds were designed as a part of the same general architectural plan with the house, and were enclosed and decorated with masses of foliage clipped in imitation of cut and sculptured stone. Their lofty hedges often completely intercepted the view from the house toward the park. A recognition of the fact that the parks were much more beautiful than the kept grounds when thus fashioned, led early in the 16th century to the art of landscape gardening, or, as it is more generally called out of England, landscape architecture. The aim of the new art was, while still keeping the park fenced off, to manage the pleasure grounds in such a way that they would provide a harmonious and appropriate foreground to landscapes extending over the park, and to make such changes in the park itself as would improve the composition of these landscapes. The scenery of the old parks often has great beauty of a special character, which is the result of the circumstances under which the more ancient and famous of them have been formed. These were originally enclosed many centuries since for keeping deer. In choosing ground for this purpose, rich land having broad

Windsor Park.

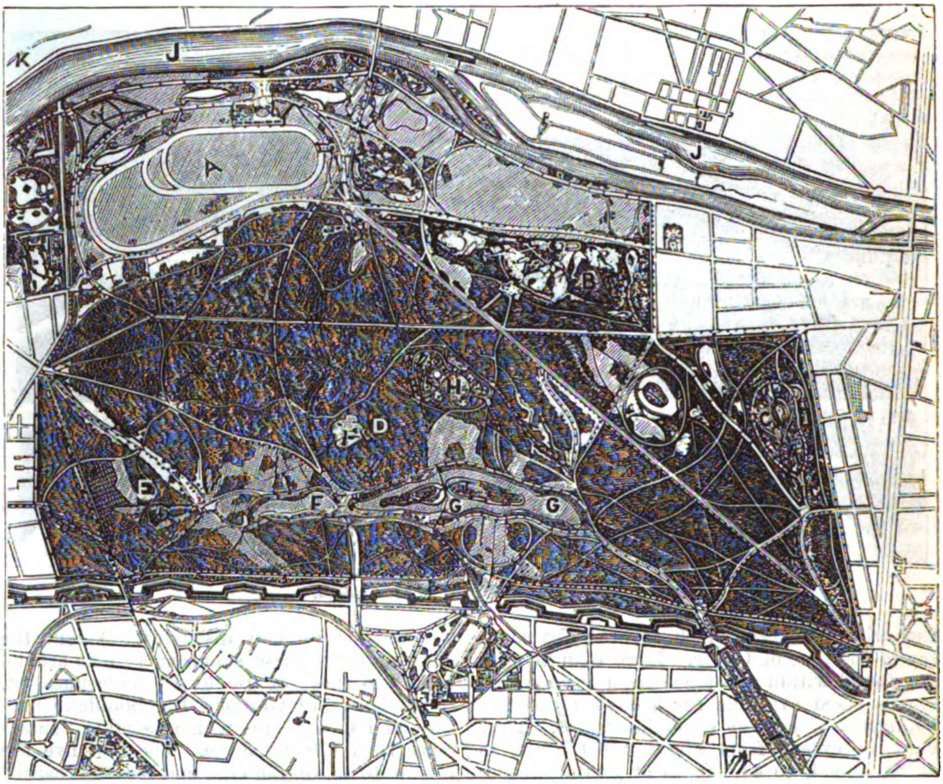
stretches of greensward pasturage, with trees more sparingly distributed than usually in the forest, was to be preferred, and this character would be increased intentionally by felling a portion of the trees, and unintentionally by the browsing of the deer; water, either flowing or still, was a necessity. In process of time the proprietors of parks established residences in them, and at length the size of their trees and the beauty of their grouping came to be matters of family pride. As the old decayed, new trees were planted, with the purpose of maintaining the original character, or perhaps of carrying it nearer its ideal. Properties of this class, being associated with that which was oldest and most respectable in the land, came to be eagerly sought for, and to be formed to order as nearly as possible after the older type; and they are to be seen now in England by thousands. As a general rule, each element in their scenery is simple, natural to the soil and climate, and unobtrusive; and yet the passing observer is very strongly impressed with the manner in which views are successively opened before him through the innumerable combinations into which the individually modest elements constantly rearrange themselves; views which often possess every quality of complete and impressive landscape compositions. It is chiefly in this character that the park has the advantage for public purposes over any other type of recreation ground, whether wilder or more artificial. Other forms of natural scenery stir the observer to warmer admiration, but it is doubtful if any, and certain that none which under ordinary circumstances man can of set purpose induce nature to supply him, are equally soothing and refreshing; equally adapted to stimulate simple, natural, and wholesome tastes and fancies, and thus to draw the mind from absorption in the interests of an intensely artificial habit of life. —Private and public parks differ only in the extent of their accommodations for certain purposes, and most of the public parks in Europe are old private parks adapted to public use. When this is not the case, and a park for public use has to be formed essentially from the bare ground, its value will chiefly depend on provisions that cannot be fully matured or have their best operation for many years after their groundwork is established. For this reason the selection of a site, the design for laying out, and the system of continuous management of a public park should be determined with great caution. The aim should be to produce the park rather than the more elaborate pleasure ground or garden style of scenery, not only for the reasons above indicated but because a ground of this character can be consistently and suitably maintained at much less cost; because, also, it will allow the necessary conveniences for the enjoyment of it by large numbers of persons to be introduced in such a way as not to be unpleasantly conspicuous or disastrously incongruous; and because it favors such a distribution of those who visit it that few shall be seen at a time, and that the ground shall not seem overcrowded. It is a common impression that the loftier and more rugged and mountain-like the site of a public ground may be, and the more wild, picturesque, and grand scenery can be imitated in its improvement, the better it will answer its purpose. A principle of art however interposes, which M. Taine, in a discussion of the unimpressiveness of certain forms of mountain scenery, explains as follows: "A landscape in order to be beautiful must have all its parts stamped with a common idea and contributing to a single sensation. If it gives the lie here to what is said yonder, it destroys itself, and the spectator is in the presence of nothing but a mass of senseless objects." It is extremely difficult to provide suitably extensive and varied conveniences for the public use of a piece of ground, the elements of which are strongly picturesque with an approach to grandeur, without destroying much of its original character; and the result of such attempts, unless under unusually fortunate circumstances and the guidance of unusual taste and skill, with the use of large means, is sure to be confusing and ineffective. Sites of much natural grandeur or even of bold picturesqueness are, therefore, to be selected for a park only where all necessary improvements for the convenience of a great number of visitors can be so managed that they will in some way strengthen rather than weaken the prevailing character. No instance of a public park exists in which this has been accomplished, but the principle is illustrated in various landscapes of the great painters. Examples may be found, for instance, in almost any book of engravings after Turner, in which the original effect of a crag of rock is shown to be augmented by buildings designed for the purpose, the bases of which are skilfully merged in its face, or where a single great building of very simple outline is given a firm and tranquil standing in a wild and broken landscape of steep declivities and rugged heights. Under good direction, sites with features of much natural grandeur, on a scale so large and of such a character that the necessary constructions for the intended visitors can be insignificant, are to be preferred to any other; but such sites have not yet been appropriated to the purpose with the advantage of a sufficiently long continued adequate direction of their improvement, and there can be but few cases where they will be. After them, and more commonly attainable, are sites the natural character of which would usually and significantly be termed "park-like." If the ideal of the old English park scenery is kept in view, rather than either that of a more picturesque or more artificially refined, finical, and elaborately embellished kind, it will be readily seen that in the site for a public recreation ground it is desirable that views of considerable extent should be controllable within its borders, and that in order to command them it should not be necessary that views beyond its borders be opened the elements of which cannot be controlled, and are liable, even in the distant future, to be made inharmonious with those of the park; especially so, where such elements will have urban rather than rural associations. It is generally better, therefore, that the outer parts should be the higher, the central parts the more depressed; that the surface should be tame rather than rugged, gently undulating rather than hilly. Water is desirable, and it will be best situated where it can be seen from the greatest number of widely distributed points of view. Relatively to the residences of those who are expected to benefit by it, the park will be best situated where there can be but little occasion to make thoroughfares through it. Otherwise, the less the distance and the more convenient and agreeable the intermediate roads, the better. As roads which radiate from a town are usually more important to be kept open than those which cross them, and as land near a town is relatively more needed for other uses than that more distant, it is commonly better that the breadth of the site should increase with its distance from the nearest point to the town, as in Prospect park, Brooklyn, N. Y. In the improvement of the site, attractive and suitable scenery has to be formed, and unsuitable elements of existing scenery changed or obscured; and at the same time and on the same ground accommodations of various kinds are to be prepared for great numbers of people, many in carriages and on horseback, many ignorant, selfish, and wilful, of perverted tastes and lawless dispositions, each one of whom must be led as far as possible to enjoy and benefit by the scenery without preventing or seriously detracting from the enjoyment of it by all others. The most essential element of park scenery is turf in broad, unbroken fields, because in this the antithesis of the confined spaces of the town is most marked. In the climate of Great Britain turf will endure on favorable soils twice as much foot wear as it will in that of Paris or northern France or the United States; yet in the more frequented London parks it is found necessary to surround with strong iron hurdles the glades on which their landscape attraction is dependent. For this and other obvious reasons, a great extent of ground must be prepared expressly for the wear of feet and wheels. In the two principal recreation grounds of Paris, the woods of Boulogne and Vincennes, though both are suburban parks and not readily used by the mass of the people, the extent of such flooring, prepared by macadamizing, paving, and otherwise, is 480 acres, or ten times the whole recreation ground of Boston, "the Common." In the Central park of New York it is 100 acres, and there is a constant public demand for its enlargement, which can only be met by reducing the verdant elements of landscape, and consequently the benefit to be obtained by the use of the park. In a public park for a city, therefore, the purpose of establishing such natural beauty as soil, climate, and topography would otherwise allow to be aimed at, must be greatly sacrificed under the necessity of providing accommodations for the travel and repose of many thousands of men and horses; and on the other hand, the extent of such accommodations must be made less than would otherwise be thought desirable, in order that the special objects of the park may be secured in a suitable degree. A plan for a park is good, indifferent, or bad, mainly according to the ingenuity, tact, and taste with which these conflicting requirements are reconciled, and to the degree in which local circumstances are skilfully turned to account if they can be made favorable, or skilfully overcome if unfavorable for this purpose. The problem is sufficiently difficult under the simplest conditions, and it is undesirable that it should be unnecessarily complicated by a requirement to provide for various purposes which have nothing in common with that of tranquillizing rest and exercise, and to which the element of landscape beauty is not essential. Soldiers, for example, drill and manœuvre, horses race, gymnasts and ball players exercise, on a piece of flat ground surrounded by buildings as well as in the glades of a wood. It is true that, when a suburban park is very spacious relatively to the number of people resorting to it for park recreation, a limited use of the larger turf areas for athletic exercises will injure it but little; but their frequent use for such purposes, especially if large assemblages of spectators are likely to be attracted, will be destructive of the value of the ground as a park, in the specific sense of the term. It is also to be considered that the proper rules and police arrangements for a park are different from those for a parade, ball, or gymnasium ground, or for a race course. Hence, when the most suitable ground near a town for these purposes adjoins that which is most suitable for a park, it is yet much better that there should be a marked division between them. Public buildings can be reconciled with the purposes of a park only in a limited degree. Ground about any building designed for an important public service should be laid out with a view, first, to convenience of communication with it; secondly, to its best exhibition as a work of architectural art. The neighboring grounds should be shaped and planted in strict subordination to these purposes, which will involve an entirely different arrangement from that which the purpose of forming a quiet rural retreat would prescribe. A similar consideration will prevent monuments and statues from being placed profusely in a park, or at all in situations where they will be obtrusive. The same cautions apply to the introduction of botanic, zoölogical, and other gardens. Their main object is as different from that of a park as that of a billiard room from a library. Both one and the other may serve for recreation, and there is an advantage in being able to pass from one to the other; but the kind of recreation to be gained by one is not that of the other, the appropriate furniture of the one is not that of the other; and their perfect combination being impracticable, the two can be much better used apart, one at a time.—In the larger part of the civilized world, circumstances are as unfavorable to park-like scenery as to grand scenery in the vicinity of large towns. The climate of France is nowhere as favorable to it as that of Great Britain, and even in the north it cannot be found in perfection unless on unusually suitable soil. In the south of France, in Italy, and on all the borders of the Mediterranean, in Mexico and California, and in short wherever a rich close perennial turf cannot be established, parks properly so called ought not to be attempted. In these cases, the two natural elements of scenery to be developed in a suburban public ground of great extent are forests (or "woods") and water. While trees in woods are by no means as beautiful as trees in parks, and a forest is apt to be gloomy and to produce an oppressive sense of confinement, the mystery of this confinement, so different from that of the walls of a town, makes it interesting and recreative. In the midst of well grown woods, public accommodations, no matter how obviously artificial, nor within reasonable limits how large they may be, detract but little from the main impression, and if fairly well designed supply a grateful relief to what might otherwise be too prolonged a mass and too nearly a monotone of color. The introduction of long strips of clear ground, even if covered with gravel or poor herbage (as at Versailles and most of the great old gardens), giving vistas through which the light may stream in visible beams, touching the walls of foliage at the side with an infinite number of lustrous flecks, produces a most agreeable impression. Bodies of water, whether formal or naturalistic in outline, in the midst of deep dark tall "woods," are still more effective. For the same reason statues, monuments, and gardens of highly colored flowers may be introduced in the midst of woods to much better advantage than in parks. —The use in America of the word park as a general designation for gardens, green courts, and all sorts of public places, is an exaggeration of a French application of the word to the more private or kept grounds of a château connected with a forest. To avoid confusion, open spaces for public use in a city may be termed "places;" grounds in turf and trees within places, "place parks;" and broad thoroughfares planted with trees and designed with special reference to recreation as well as for common street traffic, "parkways." The value of public gardens, places, place parks, and parkways, in distinction from parks and "woods," is dependent less on the extent of their sylvan elements than on the degree of convenience with which they may be used; those being the most valuable, other things being equal, through which the greatest number of people may be induced to pass while following their ordinary occupations and without serious hindrance or inconvenience. Hence the most important improvement made of late in the general plan of cities has been the introduction or increase in number and breadth of parkways which, if judiciously laid out, become principal channels or trunk lines of common traffic, to which the ordinary streets serve as feeders, so that a man wishing to go to a considerable distance shall find it a saving of time and trouble to take one of them on his way. In this respect Paris has taken the lead, having formed since 1855 over 80 m. of such trunk lines of communication from 100 to 300 ft. in width, provided with borders of trees or shrubbery, walks and drives of a special character, seats, special lighting arrangements, and other conditions more interesting and agreeable than those of common streets. The total length of boulevards and avenues lined with trees under the direction of the municipality within the enceinte of Paris is 120 m. Most of the large towns of Europe are making similar improvements, and at Washington, Chicago, Cleveland, Buffalo, Syracuse, and Brooklyn excellent examples of them exist or are in process of formation. New York, with an area of about 42 sq. m., has 7 m. of planted parkways, all of which are suburban and as yet but partly finished. Simple places, piazzas, or plazas (the two latter being equivalent terms derived from the Italian and Spanish) have the sanitary value of making a city more airy than it would be without them. If furnished with parks (place parks), they have the additional advantage of providing refreshment to the eye through the mind. If a piece of ground of one or two acres in the midst of a busy town is laid out and managed with a view to providing upon it the greatest practicable degree of plant beauty in trees, shrubs, flowers, and turf, and on the same general principles that a private garden for the same purpose would be, it will be of comparatively little use; for the walks will probably be indirect, the low planting of the outer parts will obscure the general view for passers by, and there will be frequent crowding and jostling and disturbance of quiet. Neatness and the maintenance of orderly conduct among visitors in such a ground becomes also exceedingly difficult. Hence, as a rule, at least in the United States, public grounds designed with this motive soon become more forlorn than open places would be. It is much better to decorate them in such a manner as will not destroy their openness or cause inconvenience to those who have occasion to cross them. For this purpose their plans should be simple and generally formal in style, their passages should be broad and direct, and they should be provided with seats in recesses or on the borders of the broader paved or gravelled spaces, leaving ample room for free movement. Their trees should be high-stemmed and umbrageous; conifers, except in rare instances, as permanent dwarfs, should be excluded, and flowers and delicate plants little if at all used except in vases and baskets (*corbeilles*) or as fringes of architectural objects. Interest will desirably centre in a fountain.—Every considerable town in Europe now possesses grounds which are resorted to for public recreation, and most have several of different types specially prepared and kept at public expense. In France the state has long held and managed extensive "woods and forests," remnants of the original forests which covered the country in the time of Cæsar. More than 20 such are found within a distance from Paris which makes them available for a day's pleasuring by means of railway excursion trains. They vary in extent from about 1,000 acres, as at St. Cloud, to 41,000, as at Fontainebleau. Each of these contains a château which at some time has been a royal residence, in connection with which there is a "park" or garden of several acres, generally containing a lake, fountains, statuary, monuments, parterres (as in the above engraving), and sometimes conservatories, aviaries, or other interesting objects. More or less historical interest also attaches to each, and in some quaint old customs are maintained, by which visitors are attracted. The forest proper is wilder, and in its depths many animals are found in a state of nature. It is however divided, by a network of broad avenues crossed by first, second, and third class roads and walks, into spaces of five to ten acres, so that in passing through it vistas open at frequent intervals on both sides and in all directions. Some of these forests are distinguished for great rocks, trees, and picturesque scenery; some contain in their depths broad meadows and savannas, others lakes or streams with cascades; all are guarded from depredations and policed by an organized body of men thoroughly trained in their duties under a military discipline. Among the more noted of these suburban resorts around Paris are those of Boulogne, Vincennes, St. Cloud, Marly, St. Germain, Rambouillet, Chantilly, and Compiègne, which together contain more than 170,000 acres. The first five are within 10 m. of the city, and may be reached by rail in less than half an hour. Versailles is another resort yet more famous, and in which the woods are of less importance than the palace and gardens. The woods of Boulogne and Vincennes, being nearest the city, one at its west and the other at its east side,



Fontainebleau—View from the Château.

Fontainebleau—View in the Forest.

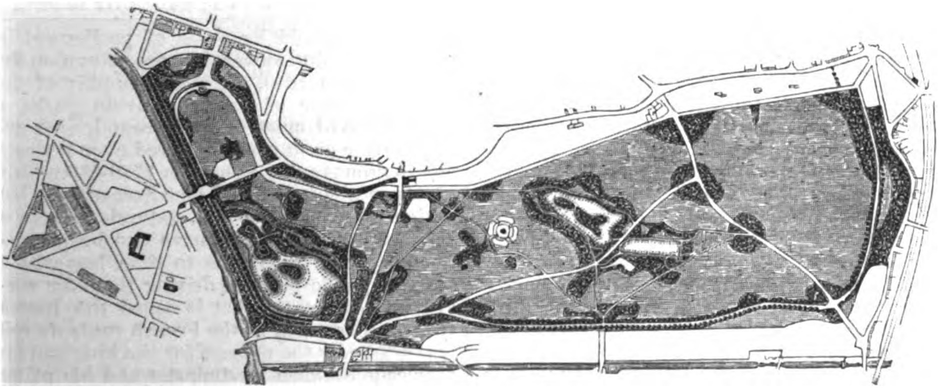
have since 1854 been placed under the jurisdiction of the municipality, and fitted by extensive and important improvements, the better to serve as recreation grounds for the daily use of the citizens. The wood of Boulogne contains about 2,500 acres, and the fortified line of the city forms its eastern boundary. The soil is naturally gravelly and poor, the trees are generally thickly sown, spindled, and weak, and the scenery flat and uninteresting. Several departmental roads (broad, straight, paved wagon ways) pass through it. Except in the refreshing wildness of a forest, it offered as late as 1855 but little to attract a visitor. Yet because of its close vicinity to the city it was already much frequented by the Parisians, and Napoleon III. saw in the neglect to which it had been abandoned the opportunity of making one of those sensations, to the frequent succession of which he owed so much of his popularity. The coarse, silicious soil was less costly to handle than better earth; good roads could be cheaply graded in it, and the materials of a sufficiently firm superstructure for so porous a base were to be had on the spot by simply screening its pebbles; for the same reason scarcely any artificial drainage was necessary. There were open meadows which could be extended to the banks of the Seine. The plan of improvement was adroitly adapted to turn all these advantages to account, so that in a short time, to those who kept to certain routes, the character of the wood seemed to have been completely changed. On the immediate borders of the new roads, and on the lines of certain vistas opening from them, the surface of the ground and the foliage appear varied and picturesque, and there are certain features of scenic interest, as a cascade and grotto, the rock of which was brought from the distant forest of Fontainebleau and skilfully wrought into masses with patches of concrete imitation of stone. The greater part of the old wood remained, as far as the operations of improvement are concerned, little changed and as uninteresting as a wood might be. The approach to the improved ground from the central parts of the town is first through the Champs Élysées, afterward for a distance of 1⅛ m. by the new avenue Bois de Boulogne (formerly de l'Impératrice). This consists of a driveway 60 ft. wide, a bridle road on one side



Map of the Bois de Boulogne.

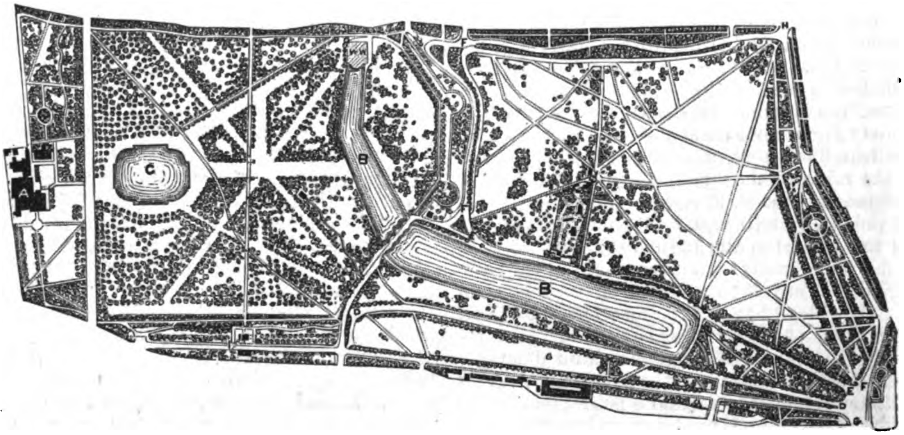
A, Hippodrome; B, Bagatelle; C, Zoölogical Ground; D, Military Magazine; E, Nursery; F, Upper Lake; G, G, Lower Lake; H, Pré Catalan; I, I, avenue Bois de Boulogne; J, J, the Seine; K, Palace and Park of St. Cloud.

of it 40 ft. wide, and a walk opposite of the same width, with borders of lawn-like ground on each side, the whole space being 300 ft. in width. In the original design this avenue was expected to become the fashionable promenade of Paris; but, probably because it was not in the outset sufficiently well shaded, fashion pushed further out to the road on the south bank of a new lake in the wood 1⅜ m. in length, where no tolerable provision had been made for it. To meet the demand, the original drive on the lake was widened to 45 ft., and a pad or bridle path introduced by its side, 40 ft. wide. Under ordinary circumstances the greater part of the visitors to the wood concentrate on these roads and the adjoining walk. There were in the whole wood of Boulogne before 1870, when a considerable space both of the old and new planting was cleared in preparation for the defence of Paris against the Germans, 1,009 acres of wooded land, 674 of unshaded turf, 75 of water surface, and 286 of drives, rides, and walks (not including the race track). The race ground of Longchamps, which is a part of the property, contains 195 acres, the ground leased to the acclimation society for a zoölogical garden, 50 acres, and the leased amusement garden, the Pré Catalan, in the midst of the wood, to which a charge for admission is made, 21 acres. There are 36 m. of public drive (including the old straight forest and departmental highways), 7 m. of ride, and 15 m. of walk. The larger part of the pleasure drives are 25 to 36 ft. broad, the widest 48 ft.; the rides 12 to 17 ft.; the walks 8 to 12 ft. The wood of Vincennes, similar in other respects to that of Boulogne, contained an ancient castle which was the centre of a great military establishment, and a large plain in the midst of the wood, used as a training ground. This has been maintained, but in other respects the design for improvement has been similar to that for the wood of Boulogne, the principal difference being that the accommodations and attractions for foot visitors at Vincennes are relatively more important. The extent of the ground is 2,225 acres, of which about half is wooded. There is a race course on the plain, and a lake of 60 acres. The public ways, not including the race track, take up 183 acres. There are no large parks within the fortified lines of Paris, but several beautiful place parks and gardens. (See PARIS.) A detailed account of them and of their admirable method of administration may be found in Robinson's "Parks, Promenades, and Gardens of Paris" (London, 1869), and one still more complete in *Les promenades de Paris*, by M. Alphonse, the chief designer of the recent improvements. The extent of the public recreation grounds within the fortified lines of the city is about 250 acres. The area of suburban grounds commonly resorted to for recreation and maintained at public expense, not including those too far away for an afternoon excursion, may be estimated at 20,000 acres. The extent of pleasure drive maintained by the municipal government is 87 m., being about 3 m. of roadway to each square mile of the city, or, counting the parkways (boulevards) shaded and with asphalt driveways, over 7 m. to the square mile. New York has less than a quarter of a mile to the square mile.—The parks and open spaces of London are very numerous, and their total extent is larger perhaps than that of those belonging to any other metropolis of the first magnitude. They are very various in area, ranging from one to several hundred acres. It has been long recognized that London owes a great deal of its physical and political health to its parks and open spaces. All the year round they act as great lungs to the mighty city, while in summer and even to a considerable extent in winter they are the Sunday resort of the weary workers. The open spaces of London are not confined to any quarter. The East End has Victoria park (300 acres); Finsbury park (115 acres), too new to be so pleasant to the eye, but still rapidly becoming what it is intended to be; and the half dozen "downs," "fields," and "commons" that go under the general name of Hackney



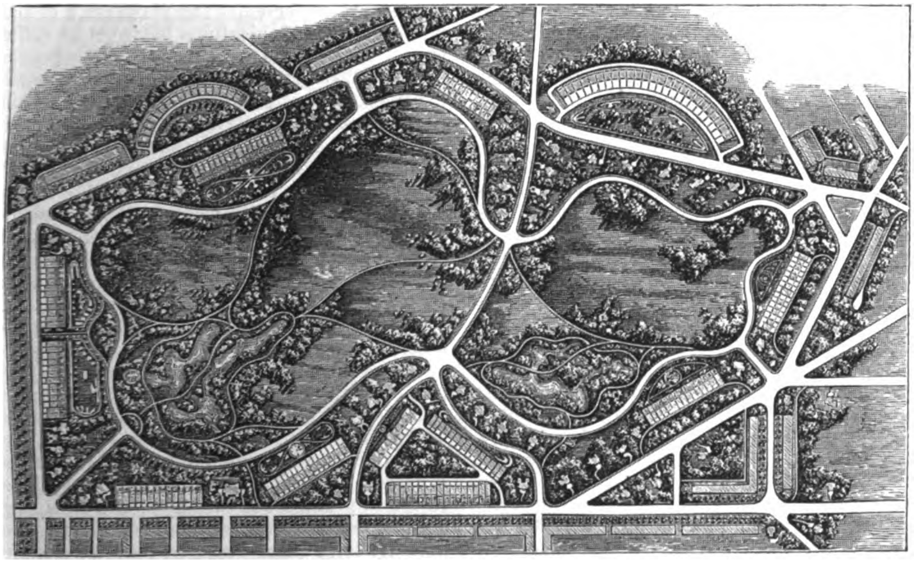
Map of Victoria Park.

Downs (50 acres). It has also, lying just outside its boundaries, the two forests of Epping and Hainault, and several green breadths that may be called everybody's and yet no man's land. South London has some of the finest of the parks and open spaces. To the southeast lie Woolwich common, Greenwich park (174 acres), and Greenwich common, and nearer at hand Lewisham common, Peckham Rye, and Southwark park (63 acres). Directly south lie Camberwell (55 acres) and various little remnants of ancient greens and commons, while the grounds of the Crystal palace may almost be said to answer as a park for the wide districts of Sydenham, Norwood, and Penge. Southwest lie Clapham common (10 acres), Wandsworth common (302), and Wimbledon common (628). Tooting Beck and Tooting Graveney commons and Battersea park (230 acres) also belong to this district. In the north lie Hampstead heath (240 acres), the Greenlanes, the grounds of Alexandra park (192), and Primrose hill. In the west are found Hyde park (about 400 acres), the Green park, St. James's park, Regent's park (450), Kensington gardens (290), and several small "greens," such as Shepherd's Bush. All these parks, commons, and open spaces are within the actual metropolitan district. Taking in a little wider radius, the heaths, downs, parks, and greens within easy reach of London become almost innumerable. First, beginning at the southeast and sweeping round by the south, west, north, and east, we find Chiselhurst common; a little southwest of this Hayes common, a great resort of cockneys in summer, where any day a score of pleasure vans may be seen; a little further to the west Addington common, also much frequented; still further west Mitcham common and Banstead downs, not to speak of those of Epsom, famous for horse races, or of the score of small spaces kept "open" by the strong hand of the law and the general consent of the people. Approaching the Thames by a northwest course, we next meet with Richmond park (2,253 acres) the largest park near London except that at Windsor (3,800), Hampton Court park and Bushy parks (1,842), and Kew park and gardens (684), the finest botanic garden in England. Crossing the river, we come next upon Ealing and Acton greens (leaving Hownslow heath on the left as out of our radius), Wormwood Scrubs, and numerous little greens and commons. North of Hampstead and Alexandra park the open spaces are fewer and smaller, and owing to a more scattered population less required. Northeast lie Epping and Hainault forests, mentioned before, each of them very large and full of natural beauty. Hyde park, the most noted of the public grounds of London, takes its name from the ancient manor of Hyde, which at one time belonged to the abbey of Westminster, became public property in 1535, was sold by order of parliament in 1652, and again recovered to the crown on the restoration in 1660. It was originally of the usual character of English private parks, a broad piece of quiet pasture ground, with numerous fine great trees scattered over it singly and in groups and masses. In 1730–'33 a body of water was introduced (the Serpentine), but with no care to give it a natural or even a graceful outline. Roads have also been formed in the park from time to time, less with a view to public pleasure driving than for convenient passages. What is called the Rotten Row (a corruption of the French *route du roi*) was originally the passage for the king and his cavalcade between Westminster and his palace of Kensington; it is a mile long and 90 ft. wide, has a surface of loose fine gravel, and is used by the public only on horseback; it is separated from the Serpentine and "ladies' mile" (45 ft. wide), the fashionable drive of London, by a walk and strip of turf of variable width. It divides and overpowers what might otherwise be a pleasing landscape expanse, and no



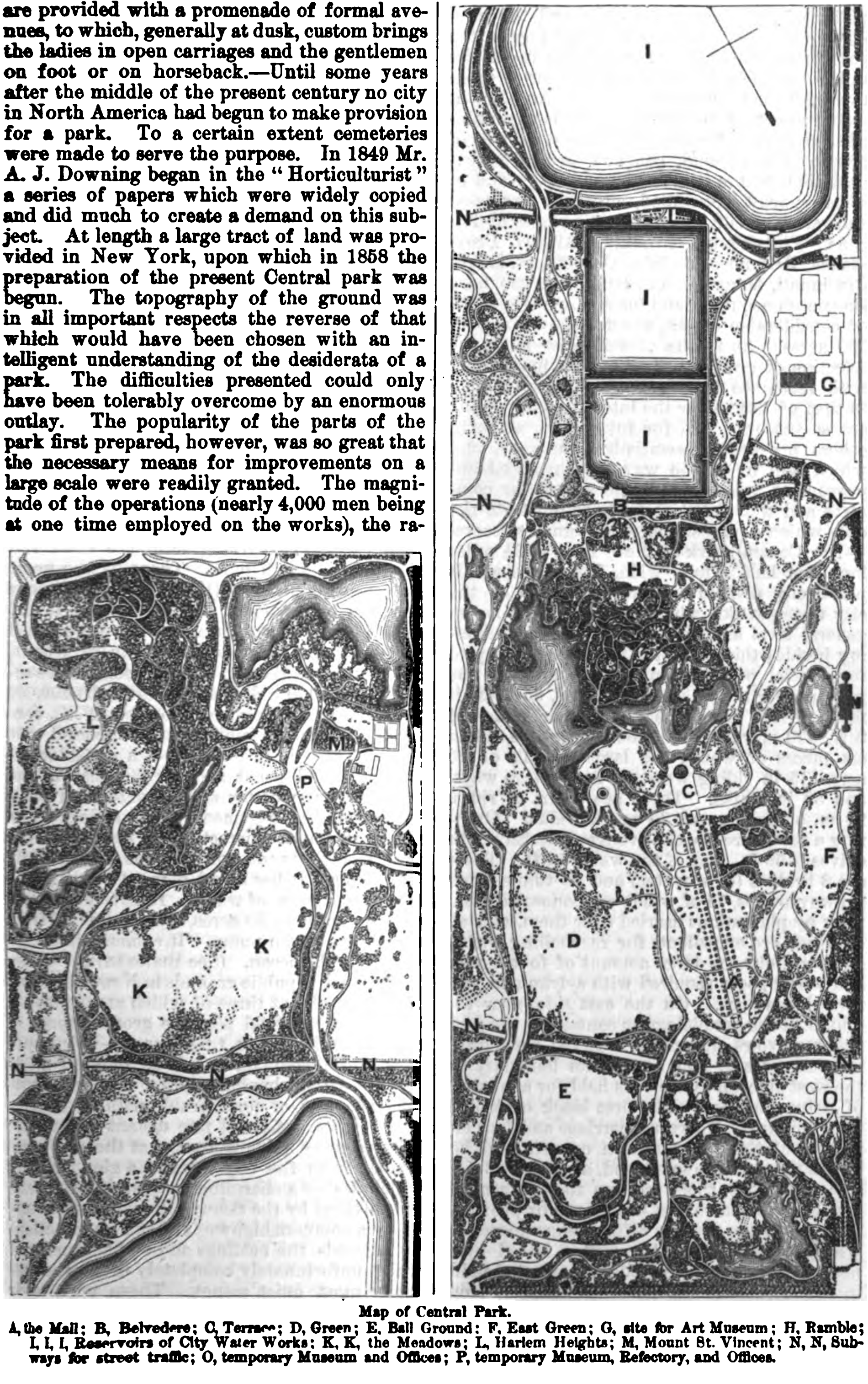
Map of Hyde Park and Kensington Gardens.—A, Kensington Palace; B B, the Serpentine; C, Round Pond; D D, Rotten Row; E E, the Ladies' Mile; F F, the Ring; G, Hyde Park Corner; H, Marble Arch; I, Prince Consort's Memorial.

attempt has been made to mitigate the harshness of the invasion. Parts of Hyde park have lately been made into gardens, and in these during parts of the summer there is a very brilliant display of flowers, "specimens," and subtropical plants; but the old trees are disappearing more rapidly than young ones are brought forward; the turf is not well kept, and to avoid its destruction in many parts iron hurdles are placed along the walks. It is thus gradually losing its beauty as a park, for which its streaks of fine gardening here and there offer no compensation. The crystal palace was erected in Hyde park in 1851, and on the site now stands the Albert memorial, completed in 1872. (See LONDON.) Regent's park, formerly part of old Marylebone park, was laid out in 1812. There is a drive of nearly two miles around it, and within are the botanic and zoölogical gardens, and a lake. Victoria park in E. London was opened to the public in 1845. A fine drinking fountain, 60 ft. high and costing £5,000, given by Lady Burdett-Coutts, was erected in it in 1862. St. James's park was formed and walled in by Henry VIII., was much improved under Charles II., and was arranged as it now appears chiefly under George IV. The public property in many of the larger commons of London is so complicated by ancient manorial and local rights that its extent cannot be accurately stated. The aggregate area of the several public and crown parks that have been named, together with so much of the commons lying within the metropolitan district as is under the board of works, is about 13,000 acres. There is also in the squares and gardens (place parks), most of which have been established by landlords and are private property but of great public advantage, about 1,200 acres.—Liverpool and its suburb Birkenhead have six parks, five of which are recent acquisitions and yet incompletely prepared for public use. The largest, Sefton park, contains 387 acres. Birkenhead park contains 120 acres, besides the leased villa grounds (60 acres) by which it is surrounded. It was undertaken as a land speculation, and though too small in scale and too garden-like for the general popular use of a large community, is very pleasing, and is one of the most instructive to study in Europe, having been laid out and the trees planted under the direction of the late Sir Joseph Paxton, over 30 years ago. The corporation of Leeds has lately purchased a noble park of 800 acres, containing a fine stream of water and a lake, formed by the previous owner, of 33 acres. Its scenery is diversified, and it commands fine distant rural views. These advantages and its exemption from injury by factory smoke compensate for the necessity the citizens will be under of reaching it by rail, its distance from the town being 4 m. Birmingham, Manchester, Bradford, and other manufacturing towns of England have acquired parks by subscriptions of citizens or by joint-stock companies. At Halifax a park has been formed and given to the town by a benevolent citizen. Derby is provided in the same way with an arboretum. The city of Lincoln is forming an arboretum on land purchased for this purpose. Most of the small towns of England have some place of recreation, as for instance the old city walls and the river banks above the town at Chester, the common and the old castle grounds at Hereford, and the cathedral greens at Salis-



Map of Birkenhead Park and adjoining Villa Sites.

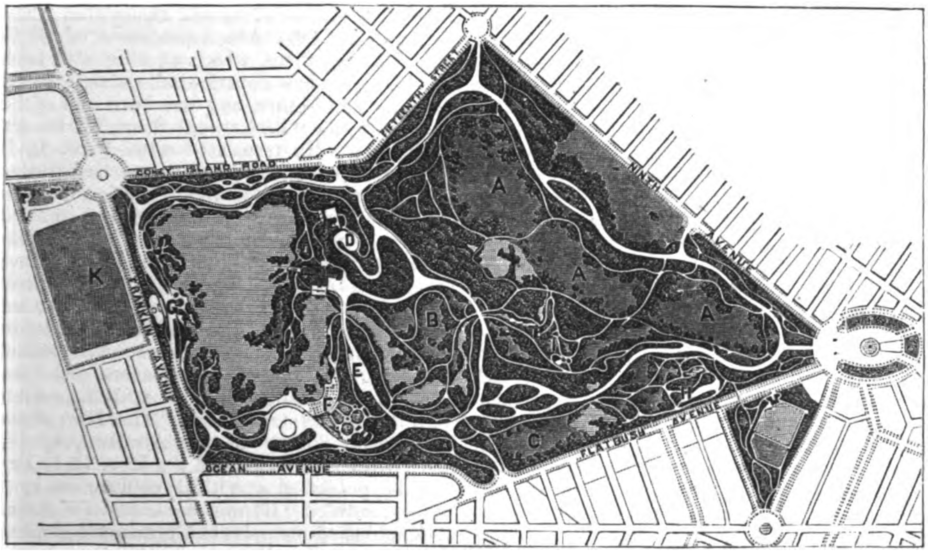
bury and Winchester. These consist in each case either of a long broad walk pleasantly bordered and leading to fine views, or a few acres of smooth turf with shaded borders. Most villages in England have a private park near them, which people are allowed to use. When this is not the case, even a hamlet almost invariably has at least a bit of cricket ground or common, where, on benches under a patriarchal oak or elm, the old people meet to gossip and watch the sports of the vigorous youth. Phœnix park at Dublin (1,752 acres) is a fine upland meadow fringed and dotted with trees, but badly laid out and badly kept, being much larger than the town requires or can afford to take suitable care of.—The old towns of the continent have generally provided themselves with recreation grounds by outgrowing their ancient borders of wall and moat and glacis, razing the wall, filling part of the moat, and so, with more or less skilful management of the materials, making the groundwork of a garden in the natural style. This is done admirably at Frankfort, Leipsic, and Vienna. Elsewhere simple broad walks bordered with trees have been laid out upon the levelled parts. The principal promenade of Vienna is the Prater, the chief feature of which is a straight carriage road over a mile long, with a walk on one side and a riding pad on the other. It contains near the town a great number of coffee houses and playhouses; but as it is 5 m. long, considerable portions are thoroughly secluded and rural. Before the recent improvements of the Bois de Boulogne, it was the most frequented large recreation ground in the world. There are numerous other public grounds at Vienna, both urban and suburban. The English garden at Munich was laid out under the direction of Count Rumford by the baron von Skell. It has serious defects, but its scenery in the English style has been considered more agreeable than that of any other public park on the continent; it is about 4 m. long and half a mile wide. The Thiergarten at Berlin contains over 200 acres of perfectly flat land, chiefly a close wood, laid out in straight roads, walks, and riding pads; its scenery is uninteresting. The Prussian royal gardens of Sans Souci, Charlottenburg, and Heiligensee are all extensive grounds, the two former in mixed, the latter in natural style. Public grounds worthy of a traveller's attention exist at Cologne, Dresden, Düsseldorf, Stuttgart, Hanover, Brunswick, Baden, Cassel, Darmstadt, Gotha, Weimar, Wörlitz, Schwetzingen, Teplitz, Prague, and Hamburg. Coffee or beer houses are important adjuncts of German public gardens. The refreshments furnished are plain and wholesome, and the prices moderate. Many families habitually resort to these for their evening meal, especially when, as is usually the case, there is the additional attraction of excellent music furnished by the government. The gardens of Antwerp, the Hague, and Warsaw, and the "city grove" of Pesth, are also remarkable. The famous summer gardens of St. Petersburg are not extensive, being but half a mile long by a quarter of a mile wide, and formal in style. They contain fine trees, are rich in statuary (boxed up in winter), and are the most carefully kept public gardens in the world, as shown in the exceeding freshness and vigor of the plants and flowers and in the deep vivid green of the turf. The more fashionable promenade of St. Petersburg is in the gardens of Katharinenhof, where on the first of May an annual procession of private carriages of almost endless length is headed by that of the emperor. A remarkable ground is that of Tzarskoye Selo, in which is the residence of the imperial family, about two hours from St. Petersburg. Besides the palace, it contains temples, banqueting houses, and theatres, a complete village in the Chinese style, a Turkish mosque, a hermitage, and numerous monuments of military and other achievements. But beyond this museum of incongruous objects there is a part in which there is natural and very beautiful scenery both open and wooded, and much of it is simple. The keeping of the ground employs 600 men. Stockholm has a great variety of delightful waterside rural walks; but the chief object of pride with its people is the Djurgard or deer park, which is a large tract of undulating ground about 3 m. in circumference, containing grand masses of rock and some fine old trees. The Haga park, also at Stockholm, is picturesque, and has the peculiarity of natural water communications between its different parts and the city, so that it is much visited in boats. The environs of Copenhagen contain many grounds of public resort, but the notable promenade of the city is the royal deer park (*Dyrhave*). In all the Italian cities, the chief public rural resorts are gardens attached to the villas of ancient noble families. The Cascine of Florence is an old pasture of the dairy of the former grand dukes on the banks of the Arno, passing through which are broad straight carriage drives. It contains little that is attractive, but commands delicious views. At a space whence several roads radiate, a band of music usually performs at intervals during the promenade hours. The municipality is now preparing promenades and recreation grounds which promise to be of remarkable interest. The fashionable promenade of Rome has been on the Pincian hill, which has few attractions except in its magnificent distant views. Since Rome was made the capital of the new kingdom of Italy, large public grounds in other quarters have been projected and in great part formed by the municipality. At Naples the fashionable promenade is the Riviera di Chiaja, a public street. It is divided into a ride, a drive, and a walk, and is nearly a mile in length, with a breadth of 200 ft. A part of it is separated from the shore of the bay of Naples by the villa Reale, planted in the garden style. Most towns of Spanish or Portuguese origin are provided with a promenade of formal avenues, to which, generally at dusk, custom brings the ladies in open carriages and the gentlemen on foot or on horseback.—Until some years after the middle of the present century no city in North America had begun to make provision for a park. To a certain extent cemeteries were made to serve the purpose. In 1849 Mr. A. J. Downing began in the "Horticulturist" a series of papers which were widely copied and did much to create a demand on this subject. At length a large tract of land was provided in New York, upon which in 1858 the preparation of the present Central park was begun. The topography of the ground was in all important respects the reverse of that which would have been chosen with an intelligent understanding of the desiderata of a park. The difficulties presented could only have been tolerably overcome by an enormous outlay. The popularity of the parts of the park first prepared, however, was so great that the necessary means for improvements on a large scale were readily granted. The magnitude of the operations (nearly 4,000 men being at one time employed on the works), the ra-



Map of Central Park.

A, the Mall; B, Belvedere; C, Terrace; D, Green; E, Ball Ground; F, East Green; G, site for Art Museum; H, Ramble; I, I, I, Reservoirs of City Water Works; K, K, the Meadows; L, Harlem Heights; M, Mount St. Vincent; N, N, Subways for street traffic; O, temporary Museum and Offices; P, temporary Museum, Refectory, and Offices.

pidity of the changes wrought, and the novelty of the scenes presented, soon gave the enterprise great celebrity; and the rapid rise in the taxable value of the land near it more than met the interest on its cost. An efficient management of its public use was maintained, and though frequented by great crowds of people it was found, contrary to general expectation, that a degree of good order and of social amenity prevailed, nowhere surpassed and rarely equalled in the public places of Europe. Philadelphia, Brooklyn, Albany, Providence, Baltimore, Buffalo, Chicago, St. Louis, Cincinnati, Montreal, and San Francisco have since each acquired land for one or more parks of considerable extent, the average being over 500 acres. As in the case of New York, the selection of ground has often been made more with reference to other considerations than to that of fitness for the intended use. Some are as yet only held for future use, while in others provisions essentially temporary, and which will be in the way of substantial improvement, are made; none are so far complete and well fitted as fairly to illustrate the ends which a park should be designed to serve. —The Central park of New York is 2½ miles long and half a mile wide, but this space is practically divided by the reservoirs of the city water works, which are elevated above its general level and occupy 142 acres. Deducting besides this certain other spaces occupied for special public purposes, the area of the park proper is 683 acres. Of this, 55 acres is meadow-like ground, 54 in smaller glades of turf, 400 of rocky and wooded surface, 43 in six pieces of water, the largest being of 20 acres, 15 in riding ways, 52 in carriage ways, and 39 in walks. There are 5½ m. of rides, 9½ m. of drives, and 28 m. of walks. Omitting a few by-roads, the average breadth of the drives is 50 ft., and of the walks 13 ft. There are 8 bridges (over water) and 38 tunnels and subway arches, 15 of which are concealed from view by plantations carried over them, and all of which are expedients for reconciling within narrow limits the large amount of foot, horse, and wheel room required with sylvan and pastoral landscapes. On the east side, near the middle of the parallelogram containing the park and reservoirs, ground is reserved for a great museum of art; and beyond its boundary on the west side another plot is held for a museum of natural history. The first block of each is now building. There are carriage and foot entrances at the two southern corners, and between them on the south end, at the termini of street railroads, there are two foot entrances; and 14 other entrances are in use or provided for. From the S. E. or Fifth avenue approach, which is most used, the visitor is led by a nearly direct course to a slightly elevated point in the interior of the park, northwardly from which, at great cost in reducing the original rocky knolls, broad green surfaces have been prepared (D, E on the map), and views of a tranquil landscape character obtained of considerable extent. At the most distant visible point a small tower of gray stone (B) has been built to draw the eye, and the perspective effect is aided by the character and disposition of the foliage, and especially by an avenue of elms (A) leading toward it. At the end of this avenue, termed the mall, the ground falls rapidly to the arm of a lake, and here a structure called the terrace (C) has been introduced, which, though mainly below the general plane of the landscape and unobtrusive, supplies a considerable shelter and place of reunion. It is designed to be richly decorated with sculptured works. On one side of it is the concert ground of the park, on the other a fountain surmounted by a bronze typifying the angel of Bethesda. The concert ground is overlooked by a shaded gallery called the Pergola, back of which is a small house of refreshment in cottage style. On the opposite side of the water is a rocky and wooded slope, threaded by numerous paths, called the ramble (F). These with the green (D), play ground reserved for the scholars of the public schools, two irregular bodies of water, and several rocky knolls (on one of which is the Kinderberg, a place for little children), form the chief features of the south park. Those of the north are a central meadow (K) divided by a rocky spur, the high wooded ground beyond it (L), with a steep rocky face on the north, and an intermediate glen with a chain of waters. The number of visits to the park sometimes exceeds 100,000 in a day, and is about 10,000,000 a year.—Prospect park of Brooklyn, N.Y., contains, with the adjoining parade ground, 550 acres. There is included in it a considerable amount of old wood, and for this reason, and because of the better soil, climate, and early horticultural management, it has a finer rural and more mature character than the New York park, though its construction was begun eight years later. It has about 6 m. of drives, 4 m. of ride, and 20 m. of walks. Its artificial water covers a space of 50 acres, and is supplied from a well by a steam pump. It commands a fine view over the ocean. (See BROOKLYN.) There are 33 smaller public grounds in New York and Brooklyn, all but three of which are improved and in use, the total pleasure ground space of the two cities being 1,600 acres.—Fairmount park of Philadelphia is a body of land 2,740 acres in extent, having a great variety of surface, all of it of considerable natural beauty. The heights command fine distant prospects; it bears many noble trees, and at the part most remote from the city there is a glen through which dashes a charmingly picturesque stream. It is divided by the Schuylkill river and crossed by a common highway and in two directions by railroads, the cuttings and embankments of which unfortunately completely break the naturally most quiet scenes. These with other structures, some of which have been recently erected and are designed to be permanent, greatly disturb its natural beauty. The object of the city in acquiring the ground was to control it against such occupations as would peril its water supply, and its permanent disposition is not fully determined. Appropriations have been already made for two large reservoirs, for pumping works, and for a zoölogical garden. No measure has yet been taken looking to the permanent preservation or special preparation of any considerable part distinctly as a park; but drives, rides, and walks have been formed, mainly temporary, by which all parts are traversed or laid open to view. Several houses which were originally private villas are used as refectories; the river is well adapted to pleasure boating; the spaces are so large that few restrictions on the movements of visitors are necessary; and in spite of the defects to which allusion has been made, the ground offers better and larger opportunities for popular rural recreation than are possessed in a single property by any other city in the world. Druid Hill park in Baltimore, of 600 acres, is a very beautiful old wood, acquired by the city in 1860, the original private improvements of which have been enlarged and extended for public use. Buffalo is forming the most complete system of recreation grounds of any city in the United States. It will consist of an inland suburban park of 300 acres, of very quiet rural character, with an ample approach from the centre of the city, and parkways 200 ft. wide extending from it in opposite directions, one to a promenade overlooking Lake Erie, the other to a parade ground and a garden on the opposite side of the town. There is a fine natural growth of trees in the main park, a lake of 46 acres has been formed, and several miles of fair macadamized roads and walks constructed, together with various suitable buildings. The work was begun in 1871, and has been advanced very steadily and economically. The aggregate area of ground occupied, including the parkways, is 530 acres. Chicago is situated in a region most unfavorable to parks, and should she ever have any that are deserving the name; it will be because of a persistent wisdom of administration and a scientific skill as well as art in the constant management of those which she is setting about, such as has been nowhere else applied to a similar purpose. The grounds appropriated are flat, poor in soil, and devoid of desirable natural growth, or, except two which look upon Lake Michigan, of any natural features of interest. In one it is proposed to transform a series of marshes partly overflowed by high water of the lake into lagoons, the quiet water surface of which is designed to take the place ordinarily given to lawns in sylvan landscapes; this, if the idea is consistently carried out, will be unique and interesting. The Chicago park system contains nearly 1,900 acres of land in six parks of an average extent of 250 acres each, three in one chain, and all with one exception connected by parkways. About 20 m. of parkway, from 200 to 250 ft. wide, has been laid out (in the city and suburbs), nearly half of which is already provided with good macadamized or concrete roads and well planted. St. Louis now controls 2,100 acres of lands held for recreation grounds, of which about 100 are in place parks, the greater part improved and in use, and the remainder suitable for parks proper, the smallest field being of 180 acres and the



Map of Prospect Park.

A, A, A, the Long Meadow; B, the Nether Mead; C, Deer Park; D, Lookout Hill; E, Breeze Hill; F, Concert Grove; G, Promenade; H, Children's Play Ground; I, Picnic Ground; K, Parade Ground.

largest of 1,350. Of the latter, one only, Tower Grove park, containing 277 acres, is yet at all adapted to use. A parkway 120 ft. wide and 12 m. long is under construction. Cincinnati has a little over 400 acres of public recreation ground, 207 being in Eden park, which lies on undulating ground commanding fine distant views, and 168 in Burnett wood, which has a similar surface with a fine growth of indigenous trees. There will be about 3 m. of pleasure road in each. Cincinnati possesses in Spring Grove cemetery the best example in the world, probably, of landscape gardening applied to a burial place; and her parks are likely to be improved with the same taste and skill. San Francisco holds 1,100 acres of land for recreation grounds, of which over 1,000 acres is in one body, called the Golden Gate park. This borders on the ocean, and is very bleak and partly covered with drift sand; no trees grow upon it except in an extremely dwarfed and distorted form, and turf can only be maintained by profuse artificial watering; but wherever shelter, fertility, and sufficient root moisture can be secured, a low, southern, almost subtropical vegetation may be maintained throughout the year, of striking luxuriance and beauty. Experiments in arresting the sand and forming a screen of foliage on the shore have been made with promising success. If steadily, boldly, and generously pursued, with a cautious humoring of the design to the unique natural conditions, and skilful adaptation of available means, a pleasure ground not at all park-like, but strikingly original and highly attractive, may be expected. Nearly 7 m. of carriage road has already been formed on the ground, and it is much used. A parkway stretching 3 m. along the shore is provided for, the reservation for it ranging from 200 to 400 ft. in breadth.—For other information concerning the parks mentioned above, see the articles on the cities where they are situated; and for accounts of the so-called national parks see WYOMING (territory), and YOSEMITE.

PARK, a central county of Colorado, situated amid the loftiest ranges of the Rocky mountains; area, about 2,000 sq. m.; pop. in 1870, 447. It includes the South park, a plateau over 10,000 ft. high, nearly level except where crossed by spurs of the mountains that form its boundaries, watered by tributaries of the S. Platte, and covered with a luxuriant growth of grass and with forests of pine. The soil is fertile, and produces the hardiest cereals, potatoes, turnips, &c. Hot and warm mineral springs and extensive salt springs exist, and lignite has been found in the N. part. Gold is extensively mined. The chief productions in 1870 were 1,480 bushels of oats, 1,675 of barley, 3,430 of potatoes, 281 tons of hay, and 5,750 lbs. of butter. The value of live stock was $45,025. Capital, Fair Play.

PARK, Edwards Amasa, an American theologian, born in Providence, R. I., Dec. 29, 1808. He graduated at Brown university in 1826, and at Andover theological seminary in 1831, when he was ordained pastor of the second Congregational church in Braintree, Mass. In 1835 he became professor of moral and intellectual philosophy in Amherst college, in 1836 Bartlett professor of sacred rhetoric at Andover, and in 1847 Abbot professor of Christian theology there, which post he still holds (1875). He has contributed extensively to periodical literature, and has been one of the editors of the "Bibliotheca Sacra" from the beginning. He translated with Prof. B. B. Edwards a volume of "German Selections" (1839); and has edited the "Writings of Rev. William Bradford Homer," with a memoir (1842); a volume on homiletics called "The Preacher and Pastor," with an introductory essay (1845); the "Writings of Prof. B. B. Edwards," with a memoir (2 vols., 1853); and with Drs. Phelps and Lowell Mason the "Sabbath Hymn Book" (1858). In 1859 he assisted in editing a volume of "Discourses and Treatises on the Atonement," for which he wrote an introductory treatise on "The Rise of the Edwardean Theory of the Atonement." In 1861, with Dr. Phelps and the Rev. D. L. Furber, he published a critical volume on hymnology, entitled "Hymns and Choirs." He has also published memoirs of Dr. Samuel Hopkins (1852), and Dr. Nathanael Emmons (1861), prefixed to editions of their works.

PARK, Mungo, a Scottish traveller, born at Fowlshiels, Selkirkshire, Sept. 10, 1771, killed in Africa probably in the early part of 1806. At the age of 15 he was apprenticed to a surgeon in Selkirk. He afterward studied medicine at the university of Edinburgh, and made a voyage to Sumatra as assistant surgeon to an East Indiaman. On his return he offered his services to the African association for the exploration of the river Niger, sailed from Portsmouth May 22, 1795, and in one month anchored at Jillifrey on the Gambia, whence he proceeded to the British factory of Pisania in the kingdom of Yani. During an illness of five months he acquired the Mandingo language, and on Dec. 2, accompanied by six negroes, set out on horseback toward the east. Unable on account of wars to traverse the country of Bambarra to Timbuctoo, he resolved to make a detour toward the north in hopes of reaching the same destination through the Moorish kingdom of Ludamar. At Benowm, the capital, a wild boar was let loose upon him, but, to the surprise of the natives, it attacked the Moslems and let alone the Christian. He was then placed in a hut, in a corner of which the boar was tied, and it was debated between the king and his advisers whether he should lose his right hand, his eyes, or his life. After more than a month's captivity and torture, he made his escape alone, and reached Bambarra. On July 21, 1796, he struck the Joliba or Niger at Sego, a city of four distinct quarters, two on each side of the river. Communication was kept up by large canoes, and Park had to wait two hours before there was room for him in the boat. Then came an order from the king forbidding him to cross, and he was indebted for relief to a woman who took him into her hut, gave him supper and a bed, and with the female part of her family sang a song about the "poor white man" which the traveller has preserved in his journal. The king sent him a guide and a present of 5,000 cowries, with which he pursued his journey down the left bank of the river to Kea, where he dismissed the guide and went by water to Silla on the opposite bank. Here he was again attacked by sickness, and despaired of advancing further into a country where the fanatical Mohammedans were paramount, and at a season when the tropical rains rendered travel impossible except by water. He set out on his return July 30, and after a long series of sufferings and robberies arrived at Pisania June 10, 1797. An American vessel carried him to Antigua, whence he took ship for England, and on Dec. 22 landed at Falmouth. His unexpected return, after he had long been given up for dead, created an extraordinary enthusiasm. An outline of his adventures was drawn up by Bryan Edwards, accompanied with geographical illustrations by Major Rennell (4to, London, 1799), but it threw little light upon the problem of the direction of the Niger. Park now returned to his father's farm in Scotland, married, and commenced the practice of medicine at Peebles. In 1805 he undertook a second journey to the Niger under the auspices of the British government. The king gave him the brevet rank of captain, and his companion and brother-in-law Mr. Anderson that of lieutenant. The other members of the expedition were Mr. Scott, draughtsman, an officer and 34 soldiers of the garrison of Goree, two sailors, and four artificers. They reached Pisania April 28, and at once pushed into the interior, keeping considerably to the south of Park's former route, and winding among the head streams of the Senegal and Gambia. They were not much molested by the negroes, but the climate proved a more deadly enemy, and before they came in sight of the Niger near Bammakoo 28 of the soldiers and three carpenters had died. With the remnant of his force Park floated down to Sansanding in canoes, where he sold some of his goods. There died Mr. Anderson. Scott had also died, and when a boat was prepared for resuming the voyage, Park's only companions were Lieut. Martyn and three soldiers, one of whom was deranged. About the middle of November they set out, having first sent back their guide Isaaco with a journal of their discoveries. In 1806 rumors reached the British settlements of Mungo Park's death, but nothing was known of his fate until the governor of Senegal in 1810 despatched Isaaco into the interior to ascertain what had become of him. From a man at Sansanding who had accompanied the party from that place to Yauri, Isaaco received a later journal, and learned that after passing Jennee, Timbuctoo, and Yauri, and repelling several attacks of the natives, they reached at Boossa a narrow pass where the river flows between precipitous rocks. Here they were set upon by the soldiers of the king of Yauri, with lances, arrows, and stones. Two negro slaves were killed in the canoe, and the white men jumping into the water were drowned. Clapperton found full confirmation of this story, and learned that Park's manuscripts were still in the king's possession, but was unable to obtain them. The narrative of Park's second journey, with a biography (London, 1815), has been translated into French and German. D'Avezac published in Paris in 1834 *Examen et rectifications des positions déterminées astronomiquement par Mungo Park;* and another biography of the traveller appeared at Edinburgh in 1835. A monument was erected in his honor at Selkirk in 1859.

PARKE, a W. county of Indiana, bounded W. by the Wabash river and drained by Sugar and Raccoon creeks; area, 440 sq. m.; pop. in 1870, 18,166. It has an undulating surface and a very fertile soil, with extensive beds of coal. The Logansport, Crawfordsville, and Southwestern railroad traverses it, and the Evansville, Terre Haute, and Chicago crosses the S. W. corner. The chief productions in 1870 were 502,230 bushels of wheat, 982,628 of Indian corn, 48,391 of oats, 65,004 of potatoes, 314,099 lbs. of butter, 110,813 of wool, and 14,512 tons of hay. There were 7,384 horses, 5,104 milch cows, 10,277 other cattle, 31,583 sheep, and 32,264 swine; 4 manufactories of carriages and wagons, 8 of cooperage, 7 of saddlery and harness, 2 of woollens, 13 flour mills, and 19 saw mills. Capital, Rockville.

PARKER, a N. county of Texas, intersected by the Brazos river; area, 900 sq. m.; pop. in 1870, 4,186, of whom 293 were colored. It consists of prairie and woodland in about equal proportions. The soil is productive. Wheat, corn, cotton, and fruits and vegetables thrive. The chief productions in 1870 were 13,658 bushels of wheat, 70,685 of Indian corn, 10,905 of oats, 13 bales of cotton, and 20,050 lbs. of butter. There were 1,497 horses, 1,222 milch cows, 10,348 other cattle, 944 sheep, and 4,383 swine. Capital, Weatherford.

PARKER, Matthew, the second Protestant archbishop of Canterbury, born in Norwich, Aug. 6, 1504, died in London, May 17, 1575. He entered Corpus Christi college, Cambridge, in 1520, and in 1527 was ordained, made M. A., and received a fellowship, and was offered by Cardinal Wolsey a professorship in his newly founded college at Oxford. In 1533 he received a license to preach, and soon after became chaplain to Anne Boleyn, dean of the college of Stoke Clare in 1535, chaplain to Henry VIII. in 1537, master of Corpus Christi college in 1544, vice chancellor of Cambridge university in 1545, and dean of Lincoln in 1552. Upon the outbreak of Kett's insurrection in 1549, he had the boldness to preach to the rebels in their camp, exhorting them to submission. Having married in 1547, he was deprived upon the accession of Queen Mary of his offices, and during her reign was obliged to remain in obscurity. Part of this time he spent in translating the Psalms into English verse, and writing a treatise entitled "A Defence of Priests' Marriages." On the accession of Queen Elizabeth he was chosen archbishop of Canterbury, and on Dec. 17, 1559, consecrated in Lambeth chapel. He successfully combated the queen's lingering affection for the use of images, filled all the vacant sees with men of decided Protestant opinions, and strove to render the rites and ceremonies of the church as uniform as possible. He founded several schools, and made many valuable presents to the colleges at Cambridge, besides establishing scholarships and fellowships. He was one of the first chosen to review the "Book of Common Prayer," and the revision called the "Bishop's Bible" was made in great part under his inspection, and published at his expense in 1568. He published a Saxon homily on the sacraments, and caused to be printed the chronicles of Matthew of Westminster, Matthew Paris, and Thomas Walsingham, and Asser's "Life of King Alfred." The work entitled *De Antiquitate Britannicæ Ecclesiæ* (1572) is commonly attributed to him, and without doubt he had much to do with its preparation.

PARKER, Nathan, an American clergyman, born in Reading, Mass., June 5, 1782, died in Portsmouth, N. H., Nov. 8, 1833. He graduated at Harvard college in 1803, became a tutor in Bowdoin college in 1805, and was ordained pastor of the South church in Portsmouth Sept. 14, 1808, which office he retained through life. When the division of the Congregational body in New England into two parties was recognized, he took his stand as a professed Unitarian. After his death a volume of his sermons was published, with a memoir by the Rev. Henry Ware, jr.

PARKER, Peter, an American missionary, born in Framingham, Mass., June 18, 1804. He graduated at Yale college in 1831, studied theology and medicine there, and was ordained and went to China in 1834. He established a hospital at Canton, intended particularly for the treatment of eye diseases; but it was soon found impracticable to exclude patients suffering from other maladies. Over 2,000 patients were admitted the first year. In surgery Dr. Parker manifested remarkable skill and wrought wonderful cures, and the fame of the hospital spread rapidly. He often preached to its inmates, and trained several Chinese students in the arts of medicine and surgery, some of whom attained considerable skill. In 1840, on the occurrence of hostilities between England and China, the hospital was closed, and Dr. Parker revisited his native land. Returning to China in 1842, he reopened the hospital, and it was thronged as before. In 1845 he resigned his connection with the American board, and became a secretary and interpreter to the new embassy from the United States, still keeping the hospital in operation. In the absence of the minister Dr. Parker acted as chargé d'affaires. In 1855, finding his health seriously impaired, he again visited this country, but by special desire of the government returned the same year to China as commissioner, with full power to revise the treaty of 1844. He acted in this capacity until a change of administration in 1857; and his health again failing, he has since resided in the United States. He has published "A Statement respecting Hospitals in China" (London, 1841), and an account of his visit to the Loo Choo islands and Japan in 1837.

PARKER, Theodore, an American clergyman, born in Lexington, Mass., Aug. 24, 1810, died in Florence, Italy, May 10, 1860. He worked on the farm which had been in his family for 150 years, and in the tool shop, and at the age of 17 began to teach school in the winter months. In 1830 he entered Harvard college, but studied at home, only attending the examinations. In 1831 he was teaching a private class in Boston. Latin, Greek, Hebrew, German, French, Spanish, and metaphysics filled his leisure. In 1832 he opened a private school in Watertown with two scholars, one of whom was on charity; but he soon had more than 50. For their benefit, and for his class in the Sunday school, he wrote a history of the Jews, which is still in manuscript. He entered the divinity school in Cambridge in 1834. Syriac, Arabic, Danish, and Swedish were here added to his list of languages; and Anglo-Saxon and modern Greek were commenced. He was one of the editors of the "Scriptural Interpreter," a magazine conducted by members of the school. During the autumn and winter of 1836 he preached in various pulpits of Massachusetts, and was settled as pastor of the Unitarian church at West Roxbury in June, 1837. Here he formed views upon the authority and inspiration of the Bible which were not in harmony with those of his Unitarian brethren. At the ordination of Mr. Shackford in South Boston, May 19, 1841, Mr. Parker preached a discourse on the "Transient and Permanent in Christianity," which, assuming the humanity and natural inspiration of Christ, gave rise to a controversy, during which Mr. Parker developed his anti-supernaturalism in various writings and sermons. In the autumn of 1841 he delivered in Boston five lectures, which were published under the title of "A Discourse of Matters pertaining to Religion" (1842). During the autumn and winter of 1842 he delivered six "Sermons for the Times" in Boston and elsewhere. He travelled in England, France, Italy, and Germany in 1843–'4; and after his return the controversy was renewed on occasion of his exchanging pulpits with some of the more liberal Unitarian preachers. He began to preach at the Melodeon, Boston, Feb. 16, 1845, and was installed there over a newly organized parish, styled the 28th Congregational society, in the spring of 1846. Up to this time, besides the writings above mentioned, his more notable productions were articles in the "Dial" and other periodicals. His translation of De Wette's "Introduction to the Old Testament," with additions, appeared in 1843. Other translations, from Ammon, Eichhorn, and Gesenius, seem to have been preparatory to that work. In December, 1847, appeared the first number of the "Massachusetts Quarterly," which he conducted during its life of three years. He became popular as a lecturer, vigorously opposed the Mexican war, and was one of the earliest advocates of temperance and anti-slavery. After the passage of the fugitive slave law in 1850, every case of attempted rendition in Boston enlisted his personal activity; and at the time of the rendition of Anthony Burns (May 24 to June 8, 1854), an indictment was brought against him for resisting an officer of the United States in his attempt to execute process, based upon a speech delivered at Faneuil hall before an anti-rendition meeting. It was quashed upon a technicality; but Mr. Parker had prepared an elaborate defence, which he printed. In November, 1852, his congregation occupied for the first time the great music hall in Boston, which was crowded every Sunday. He was now often ill, and compelled for a while to cease preaching and writing; but his persistent will carried him through till January, 1859, when an attack of bleeding at the lungs brought to a close his public services at the music hall. On Feb. 3 he sailed for Santa Cruz, whence in May he sent a letter to his parish entitled "Theodore Parker's Experience as a Minister." Thence he sailed to Europe, spent some time in Switzerland, and went to Rome, where he passed the winter of 1859. Setting out thence in April, 1860, very much enfeebled, he reached Florence with difficulty, where he died. He was buried in the cemetery outside the walls.—Parker's published works are: "A Discourse of Matters pertaining to Religion" (1842); "Miscellaneous Writings" (12mo, Boston, 1843); "Occasional Sermons and Speeches" (2 vols. 12mo, 1852); "Ten Sermons on Religion" (1853); "Sermons on Theism, Atheism, and the Popular Theology" (1853); "Additional Speeches, Addresses," &c. (2 vols. 12mo, 1855); "Trial of Theodore Parker for the 'Misdemeanor of a Speech in Faneuil Hall against Kidnapping'" (1855); "Two Christmas Celebrations;" and "Experience as a Minister" (1859). A collective edition of his works was edited by Frances Power Cobbe (12 vols., London, 1863–'5), and a later edition by H. B. Fuller (10 vols. 12mo, Boston, 1870). His "Life and Correspondence" was published by the Rev. John Weiss (2 vols. 8vo, New York, 1864), and his "Life" by the Rev. O. B. Frothingham (New York, 1874). See also Albert Réville's *Théodore Parker, sa vie et ses œuvres* (Paris, 1865). His library of more than 13,000 volumes he bequeathed to the public library of Boston.

PARKER, Willard, an American surgeon, born in Hillsboro, N. H., Sept. 2, 1800. He is the sixth in descent from one of five brothers who came from England in 1644 and settled at Chelmsford, Mass., to which place his father returned when Willard was five years old. He graduated at Harvard college in 1826, commenced the study of medicine under Dr. John C. Warren, the professor of surgery in Harvard university, and received the degree of M. D. there in 1830. He was at once appointed professor of anatomy in the Vermont medical college, and in the same year accepted the chair of anatomy in the Berkshire medical college, and in 1833 also that of surgery. In 1836 he was appointed professor of surgery in the Cincinnati medical college, and afterward spent some time in the hospitals of Paris and London. In 1839 he became professor of surgery in the college of physicians and surgeons of New York, which post he resigned after a service of 30 years, but accepted that of professor of clinical surgery, which he now holds (1875). In 1865 he was elected president of the New York state inebriate asylum at Binghamton, succeeding Dr. Valentine Mott. This was the first institution ever established for the treatment of inebriety as a disease. In 1870 he received the degree of LL. D. from the college of New Jersey at Princeton. Dr. Parker was the first to point out a condition which is known as concussion of the nerves, as distinguished from concussion of the nerve centres, and which had been previously mistaken for one of inflammation. The operation of cystotomy for the relief of chronic cystitis, and also that for the cure of abscess of the *appendix vermiformis*, are among his contributions to the art of surgery.

PARKERSBURG, a port of delivery and the capital of Wood co., West Virginia, the second city in the state in population, on the Ohio river, at the mouth of the Little Kanawha, 92 m. below Wheeling, and 65 m. N. of Charleston; pop. in 1850, 1,218; in 1860, 2,493; in 1870, 5,546, of whom 447 were colored; in 1875, about 7,000. The site rises gradually to a plateau 100 ft. above low-water mark, and extends more than a mile up the Ohio and nearly two miles along the Little Kanawha, embracing about three square miles. In the rear rises an isolated eminence, known as Prospect hill, affording extensive views. The city is regularly laid out in squares, with streets 60 ft. and alleys 20 ft. wide. The principal public buildings are the court house, market house, two brick school houses, and seven brick churches. A building for the accommodation of the United States courts, post office, and custom house is in course of erection. Parkersburg is favorably situated for trade and manufactures. The tributary country, including the valley of the Little Kanawha, is fertile and well timbered, and contains petroleum, coal, iron, and salt. Four medicinal springs, 6½ m. from the city and 2 m. from the Little Kanawha, have been much frequented. There is a covered bridge across the Little Kanawha, and one across the Ohio costing $1,000,000, over which the Parkersburg division of the Baltimore and Ohio railroad passes into Ohio. Regular lines of steamers run to Wheeling, Charleston, Cincinnati, and other points on the Ohio and Great Kanawha rivers. Recent improvements in the Little Kanawha render it navigable 38 m. above Parkersburg, and afford abundant water power. One of the most important interests is the refining of petroleum, for which there are six or seven establishments, producing about 200,000 barrels of illuminating and 100,000 of lubricating oil annually. The annual value of oil shipments is about $3,000,000. Other important establishments are a barrel factory, a chemical laboratory, three founderies, with two of which machine shops are connected, the repair shops of the railroad, two flouring mills, two saw mills, a mill for sawing, planing, and manufacturing doors, blinds, &c., a boat-building yard, a furniture factory, a carriage factory, a tannery, three tobacco factories, two potteries, two brick yards, and a sandstone quarry. There are three national banks, with an aggregate capital of $450,000, a fire insurance company, a high school, several free ward schools, several academies, two daily and three weekly newspapers, a monthly periodical, and ten churches: Baptist, Episcopal, Methodist, Presbyterian, Roman Catholic, and United Brethren. The United States circuit court is held here annually.—Parkersburg was incorporated as a town in 1820, and as a city in 1860.

PARKMAN, Francis, an American author, born in Boston, Sept. 16, 1823. He made in the latter part of 1843 and the beginning of 1844 a rapid tour in Europe, graduated at Harvard college in the latter year, and studied law for two years, but abandoned it in 1846 and started to explore the Rocky mountains. He lived for several months among the Dakota Indians and the still wilder and remoter tribes, and incurred hardships and privations which made him an invalid for the rest of his life. An account of this expedition was given in "Prairie and Rocky Mountain Life" (New York, 1849), reissued subsequently as "The California and Oregon Trail." This was followed by "The Conspiracy of Pontiac" (Boston, 1851), the first of a series intended to illustrate the history of the rise and fall of the French dominion in America. His next work was "Vassall Morton" (Boston, 1856), a novel the scene of which was partly in America and partly in Europe. He visited France in 1858, and again in 1868, to examine the French archives, and the result of his researches is given in "Pioneers of France in the New World" (1865), "Jesuits in North America" (1867), "Discovery of the Great West" (1869), and "The Old Régime in Canada" (1874). These works are distinguished for their brilliant style and for accurate research, and have been written under the disadvantages of feeble health and of an affection of the eyes which renders him often wholly unable to read or write. In 1866 Mr. Parkman published "The Book of Roses," and in 1871 he was appointed professor of horticulture in the agricultural school of Harvard university, which post he resigned in 1872.

PARLIAMENT (low Lat. *parlamentum;* Fr. *parlement*, from *parler*, "to speak"), originally a meeting or assembly for conference or deliberation; afterward applied in France to the principal judicial courts, and in England to the legislature of the kingdom. The word, or one very like it, was long in use in France, and was first applied there to general assemblies in the time of Louis VII., about the middle of the 12th century. I. THE BRITISH PARLIAMENT. The earliest mention of the word parliament in the statutes of England occurs in the preamble to the statute of Westminster, 1272. Many writers have asserted the identity of the modern parliament with the general councils of the Saxons, with their *michel-gemote* or great meeting, or their *witena-gemote* or meeting of the wise men; and also with the *commune concilium* and *magnum concilium* of later times. It is indeed indisputable, as Blackstone says, that general councils are coeval with the kingdom itself; but that those of early times bore any essential resemblance to the present parliament is far from certain. We may probably with safety assume that the present constitution of parliament existed early in the 14th century. In Magna Charta, King John promises to summon all archbishops, bishops, abbots, earls, and greater barons personally, and all other tenants in chief under the crown by the sheriffs and bailiffs; and there are still extant writs of the date of 1265, summoning "knights, citizens, and burgesses" to parliament. A statute passed in the reign of Edward II. (1322) declares that certain matters shall be established in parliament "by the king and by the assent of the prelates, earls, barons, and the commonalty of the realm, as has before been accustomed." The imperial parliament of the United Kingdom of Great Britain and Ireland is composed of the crown and the three estates of the realm, the lords spiritual, the lords temporal, and the commons. It is the prerogative of the crown to convoke, continue, or dissolve it. Formerly it was the theory of English constitutional law, that the power of the crown in these respects was measured only by its pleasure; that the sovereign might omit during his whole reign to call a parliament; or if he called one, might keep it undissolved for the same period. But now, on the authority of statute and otherwise, it is established that no parliament can last longer than seven years, and that writs for summoning a new parliament shall issue within three years from the dissolution of the last one. The sessions of parliament may be suspended by adjournment or prorogation, and ended by dissolution. The power of adjournment belongs to each house respectively; the sovereign may request but not command an adjournment. A royal proclamation may issue, however, summoning parliament to meet within not less than 14 days, notwithstanding an adjournment beyond that period. Parliament may be prorogued to a certain day only by the sovereign; it is effected through the lord chancellor, or by writ under the great seal, or by commission. The effect of a prorogation is to put an end to all proceedings pending at the time, except impeachments by the commons and appeals and writs of error in the house of lords. On the meeting of parliament after prorogation, a bill pending before must be renewed as if it had never been introduced. The power of dissolving parliament is vested in the sovereign; its existence is ended by dissolution, after which writs of election for a new parliament must be issued. In practice, parliaments assemble annually, and must continue to do so while the legislation for the army, the judiciary, and the whole service of the kingdom has validity and makes appropriations for only a twelvemonth. Among the other constitutional prerogatives of the crown, as a branch of parliament, are its negative upon the choice of a speaker by the commons, and upon bills passed by both houses. But neither of these prerogatives could now with safety be arbitrarily asserted by the sovereign.—*House of Lords.* This body is composed of the lords spiritual and temporal, the former consisting of the archbishops of Canterbury and York, and 24 bishops. Until the dissolution of the monasteries in the time of Henry VIII., the mitred abbots and two priors had seats with the lords; and after the union with Ireland one archbishop and three bishops of the church of Ireland also had seats until the disestablishment of that church on Jan. 1, 1871. The whole number of peers in 1873 was 479. Most of the peerages are of recent creation. The three oldest date from the 13th century, and only four others go back to the 14th. Up to 1874, 239 had been created within the present century. The bishops were excluded from parliament during the commonwealth, but were restored by statute. With this single interruption, they have always been present in parliament, and with unquestioned right. The lords spiritual are lords of parliament, though not peers of the realm. When therefore a peer is to be tried, the bishops are entitled to take part in the proceedings, though, in conformity with the canons of the church, which forbid them to vote in capital causes, they are generally absent from the judgment. Being not of noble blood, like the hereditary peers, for a capital offence they are tried by a jury like other commoners. The lords temporal are divided into dukes, marquises, earls, viscounts, and barons. They are the hereditary peers of the realm, ennobled in blood, and subject to loss of their dignities only by attainder or by act of parliament. Since the union with Scotland in 1707, and with Ireland in 1801, 16 Scottish and 28 Irish representative peers have been returned to parliament by the peerages of those countries. The former sit during one parliament only; the latter are chosen for life. They enjoy all the privileges of parliament, and may sit upon the trial of peers. A peer is made so by the royal patent or writ which summons him to parliament, and the dignity is usually made hereditary by limitation to the heirs male of his body, although it is sometimes provided that it may descend to others, as for instance to his nephew or brother. The power of the crown to create a life peerage raised in 1856 an important question, which was earnestly debated. On retiring from the bench Sir James Parke (Lord Wensleydale) was created baron of the United Kingdom for and during his life, instead of the usual limitation. Government urged as a reason for granting life peerages, the convenience of adding to the number of law lords in the house, these being peers who have held high judicial office in the kingdom, and who substantially alone determine all judicial causes. It had happened in 1855 that only two law lords, the lord chancellor and Lord St. Leonards, had sat to hear arguments. Upon some of the causes they differed in opinion, and as, upon a familiar maxim in the procedure of the lords, this equality of votes led in each case to affirmance of the decrees brought up from inferior courts, appellants argued that there was virtually no decision, and expressed great discontent. For the remedy of this and other mischiefs the creation of life peerages was proposed. After prolonged discussion, the lords decided, if not against the strict legality of the measure, yet against its constitutional expediency. The crown retreated from its position, and Lord Wensleydale received a patent in the usual form. The peers of the realm possess titles of honor which give them the privileges of rank and precedence, and they are individually the hereditary counsellors of the crown; with the lords spiritual they form, when not assembled in parliament, the permanent council of the sovereign, though they may act in the same capacity when so assembled, as for example in addressing the throne upon matters of foreign or of domestic policy. When sitting in parliament the peers form in conjunction with the lords spiritual a branch of the supreme legislature of the kingdom; and, in the exercise of peculiar functions, they constitute a court of judicature. In its judicial office the house of lords has a distinctive character as the highest tribunal of the realm. The lords have an original and exclusive jurisdiction in the trial of peers, and under reference from the crown upon claims of peerage and affairs of honors. By the acts of union they have a like jurisdiction over cases of contested elections, or the rotation of the Scottish or Irish representative peers. They also had until recently a general jurisdiction as the supreme court of appeals. These judicial functions the house of lords had as the representative of the ancient *concilium regis*, or council of the king, which under the early Norman kings had jurisdiction both in civil and criminal causes, especially in those relating to great persons and to officers of state, and by way of appeal from all other courts. In respect to the construction of the house for any legislative purpose, there is no distinction between the lords temporal and the lords spiritual. The presence of three members who have been duly summoned and sworn constitutes a quorum; and when a speaker has been appointed, the house may proceed to act either as a branch of the legislature or as a supreme court of judicature. The lord chancellor or lord keeper of the great seal is speaker *ex officio*, and an ancient order declares it to be "his duty ordinarily to attend the lords' house of parliament." To make provision for his necessary absence, deputy speakers are appointed by commission from the crown, "to officiate from time to time during the royal pleasure in the room and place of the lord chancellor." The office is generally conferred upon the chief justice of the king's bench, or the chief baron of the exchequer. In the absence of both the lord chancellor or keeper and the deputy speakers, the lords themselves select a speaker *pro tempore*. The person who acts as speaker need not be a member of the house, nor indeed of the peerage. Commoners have often been raised to the office. They may sit as speakers upon the woolsack, for constitutionally that is not within the limits of the house. The lords answer "Content" or "Not content" in voting, and on an equality of votes the effect is the same as if there were a majority of "not content," for the maxim of the house is: *Semper præsumitur pro negante.*—Until the establishment of the supreme court of England (1873–'5) the lords had jurisdiction of writs of error and appeals from the common law and equity courts. The former was of great antiquity; the latter dates only from 1621, and was not acquiesced in until after angry and prolonged disputes between the two houses of parliament. The right to exercise it was questioned by some of the first lawyers of the time, including Sir Matthew Hale. The triumph of the peers is usually ascribed to the earl of Shaftesbury, who insisted that the lords' power of review extended over all the courts in the kingdom, civil, criminal, and ecclesiastical. But from the last named courts appeals have never been entertained. So orders made on motion or petition in matters of idiocy, lunacy, or bankruptcy were not carried up to the lords, but to the king in council. Writs of error to the lords were confined to matters of law. They might lie from all judgments of the courts of exchequer chamber in England and Ireland, and from all judgments in common law of the court of exchequer of Scotland; from all such judgments of the courts of queen's bench in England or Ireland as were not immediately reviewable by the courts of exchequer chamber of the two countries; from all judgments of the common law or "petty bag" side of the high court of chancery; and from the decisions of the commissioners of error appointed to review the common law proceedings of the London municipal jurisdictions. The act of 1873 (which as originally enacted was to take effect in November, 1874, but in August of that year was postponed to November, 1875), creating the supreme court of England, takes from the house of lords its jurisdiction on writs of error and appeals from the several superior courts of England, and confers it upon "Her Majesty's Court of Appeal" thereby provided for. (See COURT.)—*House of Commons.* The lowest branch of parliament, the third estate in dignity, but in fact the foremost in substantial power, is the commons; or, to use the title which suggests the composition of this house, the knights, citizens, and burgesses. We have seen that the first clear intimation of two branches of parliament (not then necessarily sitting separate, however) is afforded by Magna Charta. That instrument provides a mode of summons according to rank. The greater barons were to be individually cited by special writs, while the other tenants *in capite* were to be called by general summons. That is to say, with regard to the former of these classes an individual and absolute right seems to be conceded; while with regard to the latter, those were considered to be entitled and summoned whom the general body should select as their representatives. Thus these inferior landed proprietors, or lesser barons as they have been called, ceasing gradually to be regarded as peers, were allowed and sometimes directed to be summoned as knights of shires. Gradually, too, their privilege diminished, till they lost altogether the right of sitting with their superiors; and, merging in the commonalty, they came, probably at the close of the 13th century, to form with the representatives of cities and boroughs the lower house. During the reigns of the first three Edwards, the power of the commons was materially enlarged and firmly established; and to the time of Edward IV. Hallam refers the foundation of the principle that the assent of the two houses is necessary to every legislative act. But owing to the jealousy of the upper house, and to its opportunities for defeating the rights of the commons, the principle was for a long time not carried out. In the reign of Henry VI. it first became true in fact, as it had long been in the theory of the government, that "the law of the land is made in parliament by the king and the lords spiritual and temporal and all the commonalty of the realm."—It is the exclusive right of the commons to originate all bills which either directly or by construction impose any burden or charge on the people; and these bills include not only those which provide supplies for the general administration of the government, but also all those which contemplate a tax upon the public for any purpose or in any mode. All other bills of whatever nature may originate in either house indifferently. In practice, each house appropriates to itself peculiar cognizance of those matters of which, from its experience and constitution, it is the most competent judge. For example, bills which concern the settlement of peerages begin naturally with the lords; while bills for regulating elections originate as naturally with the commons. The commons have not final appellate jurisdiction like the lords; yet in certain cases they exercise judicial functions, and when proceeding in such cases they are a court of record, and their journals bear the credit of public records. Examples of these functions are the consideration of cases of contested elections and returns, and the hearing and punishing of contempts. Acting in concurrence with the lords, they exercise higher powers of judicature, as in matters of attainder and pardon, and until lately of divorce. The house of commons consists at present of 658 members. Of these England and Wales send from counties 187, from the universities 5, and from the towns 308. Of the Scottish members, 30 come from counties and 23 from towns. Ireland returns 64 members for counties, 39 for towns, and 2 for the university of Dublin. Although the ordinary cost of an election to parliament is considerable, and immense sums are sometimes spent in a close contest, the members receive no salary. Formerly they were paid a prescribed amount by their constituencies, the poorer of which sometimes got excused from electing members to avoid the expense. The religious disqualifications which formerly excluded some persons from parliament were removed, partly by the repeal of the test act in 1828, and partly by the Catholic emancipation act of 1829. Until 1858 Jews were shut out from both houses by that clause which required the oath to be taken "on the true faith of a Christian." This disabling clause has not been stricken from the formulas of the oaths, but in the year just named a statute was passed which permits either house to dispense with it at its pleasure in the administration of them. No peer of parliament is eligible to the commons; yet any Irish peer, not of the number of the 28 representatives, may sit in the lower house. This rule is not true of the same class of Scottish peers. No person officially employed about duties or taxes created since 1692 (except commissioners of the treasury), no officer of excise, customs, stamps, &c., no pensioner of the crown, no contractor with government, no judge of the king's bench, common pleas, or exchequer, no chancellor or vice chancellor (it is otherwise with the master of the rolls), and no police justice of London, is eligible; and by statute 6 Anne, c. 27, it is provided that no person holding any new office under the crown created since 1705 is eligible. If any member of the house of commons accept any office of profit under the crown while he is a member, his seat becomes vacant, but he may be again elected. The house of commons has given various constructions of this statute, and expressly excepted from it a large number of offices. The clergy of the church of England and Ireland are ineligible. Sheriffs of counties, mayors, and bailiffs of boroughs, as returning officers, are also incapacitated. Ministers of the crown, however, are required to hold seats in one house or the other; and members of the lower house, on receiving a cabinet appointment, resign their seats and appeal to their constituents for reëlection, as an indication of confidence in the ministry.—Until it was remodelled in 1832 by the reform act, the parliamentary franchise remained as it had been fixed by statutes of the time of Henry VI. It had been narrowly restricted by these statutes, both in the counties and in the boroughs, and the necessity of a thorough change had long been insisted on. The tory ministry of the duke of Wellington in 1830 was brought to an end by the determined opposition of the premier to any change in the representation and suffrage, and was succeeded by a ministry headed by Earl Grey, who had been the steady advocate of parliamentary reform for 40 years, and who then stood at the head of the whig aristocracy. The first reform bill was introduced into the house of commons, March 1, 1831, by Lord John Russell, and was carried on the second reading after great debates, by a vote of 302 to 301. Subsequently the ministers were defeated on several questions, and parliament was dissolved, April 22. The new house of commons was chosen under great popular excitement, and in a full house the ministerial majority was about 130. Another reform bill was brought forward, and after a discussion of many weeks was passed, 345 to 236. The house of lords threw out the bill by 41 majority. This caused great indignation. Immense popular meetings were held, and there were riots at Derby, Nottingham, and Bristol. On Dec. 12 a third reform bill was brought forward, which passed to a second reading by 162 majority. The lords passed it to a second reading by 9 majority, April 14, 1832; but on May 7, in committee, they defeated the ministry by a majority of 35. The court was almost entirely opposed to reform, and the king's mind had been acted on by most persons who surrounded him adversely to the popular cause. He had been averse to the creation of peers, and it was understood that the peers should allow the bill to pass. This understanding having been departed from, the ministry demanded a creation of peers from the king. He refused, and they resigned. Wellington undertook to form a government, but the house of commons set itself in resolute opposition to the duke, and advised the king to create as many peers as should be necessary to carry the bill through the upper house. On May 15 the whigs announced their return to power, and in June the lords passed the reform bill. Fifty-six boroughs that had returned 111 members were extinguished; 30 others lost one member each; and 2 united boroughs that had sent 4 members were reduced to 2. As no reduction of the numbers of the lower house was made, this left 143 members to be disposed of, 65 of whom were given to counties, 22 to the metropolitan districts and other boroughs with populations of 25,000 and upward, and 21 to boroughs having 12,000 inhabitants and upward. New and great constituencies were created in England and Wales. Numerous improvements in elections were provided. Inhabitancy was made the basis of the borough franchise. Under certain regulations occupants of houses of the yearly value of £10 became electors. The county franchise was extended to copyholders and leaseholders, and under some circumstances to occupiers of the value of 40*s.*, thus destroying the monopoly of the freeholders, who were not allowed to vote for both county and borough. It was also extended to tenants at will of the annual value of £50. In 1867-'8 a new reform bill was carried through by the conservative ministry of Disraeli. Under this, voters may be classed as follows: In counties: 1, 40*s.* freeholders, or those owning property in fee of that value per annum; 2, those possessing an estate for life or lives of the annual value of 40*s.*, which, if not occupied by them, must have been possessed before June 7, 1832, or must have been acquired by marriage, marriage settlement, or devise, or by virtue of some benefice or office; 3, those possessing an estate for life or lives of the annual value of £5; 4, lessees for terms not less than 60 years of the annual value of £5, or not less than 20 years of the annual value of £50; 5, occupiers of lands rated at £12 per annum. In boroughs: 1, the rated occupiers of dwelling houses within the borough who have duly paid their poor rates; 2, rated occupiers of premises other than dwelling houses of the annual value of £10; 3, occupiers of lodgings of the annual value of £10 if let unfurnished and in one and the same dwelling house. Following this reform bill others were passed for Scotland and Ireland, enlarging the franchise, but not in entire conformity to that in England. Voting for members of parliament had always been by show of hands or *viva voce* until, after long agitation, the secret ballot was adopted under the Gladstone administration in 1872.—The presiding officer of the commons is called the speaker, who is chosen by the house from among its own members, subject to the approval of the crown, holding his office till the dissolution of the parliament in which he was elected. His salary is £6,000 a year, exclusive of a furnished residence. At the end of his official labors he is generally rewarded with a peerage and a pension. Until 1853 business could not be transacted in his absence; but in August of that year it was resolved that, during his unavoidable absence, the chairman of committees of the whole house should preside in his stead. Forty members must be present to constitute a house, excepting when the commons are summoned by the sovereign or the royal commissioners to attend at the bar of the lords, which *per se* constitutes a house, whether 40 members be present or not. According to ancient practice, the house always adjourns to 10 o'clock in the morning, and should the speaker take the chair (40 members being present) at any time between that hour and 4 P. M., the appointed proceedings may immediately commence; otherwise no business can be transacted on that day, and the house will consequently adjourn to 10 o'clock A. M. on the following day. The present general practice is to commence business at 4 P. M., with the exception of Wednesdays, when the house sits from 12 to 6. The house does not usually sit on Saturday. It was an ancient privilege of the house of commons to judge of the qualification and return of its own members, and this has never seriously been questioned since the quarrel with James I. regarding it in 1603. The royal proclamation for the election of members to the first parliament of that monarch expressly commanded that "care be had that there be not chosen any persons bankrupts or outlawed;" and when Sir Francis Goodwin, who had been outlawed in civil proceedings, was chosen by the electors of Bucks, the returning officer refused to return him, and Sir John Fortescue was sent up in his stead. Nevertheless the house seated Sir Francis Goodwin, and refused to confer with the lords on the subject, or to defer to the opinion of the judges that his election was void, insisting upon its right to judge solely and finally in the premises. A prolonged controversy took place, ending in a compromise under which a new election was had. Under recent legislation, however, in the belief that the house is an unsuitable body to try contested questions of fact, election cases are tried before judges assigned for the purpose. II. SCOTTISH AND IRISH PARLIAMENTS. Scotland while an independent kingdom had a parliament, dating, it is supposed, from the 13th century, and very similar at first to that of England, but never like the English divided into two houses. It comprised the high ecclesiastics, the great nobles, and the representatives of the freeholders of the counties and of the citizens of the royal burghs, who all sat in one hall. The functions of a house of lords or higher house were performed in some degree by a committee called "the lords of the articles," consisting latterly of 32 members, who did all the work of parliament, the house doing scarcely more than to pass the acts proposed by the committee. The Scottish parliament was abolished by the legislative union of Scotland with England in 1707.—In Ireland a parliament was formed by the English settlers toward the end of the 13th century, but it was not till the reign of James I. that the whole island was represented. The Irish parliament, however, was held to be subordinate to that of England till 1783, when its exclusive authority in matters of legislation and judicature for Ireland was formally admitted. Its brief independence and its existence, however, terminated in 1800 by the union of Ireland with Great Britain. III. French Parliaments. These bodies were supreme courts of law, and were established at successive periods in the principal cities of the kingdom. The most ancient and important was the parliament of Paris, the foundation of which is ascribed to Louis VII. about the middle of the 12th century. It was at first a court of justice which accompanied the king wherever he went, till Philip the Fair fixed it at Paris by an ordinance dated March 23, 1302. The other principal parliaments of France were instituted in the following order: Toulouse, 1302; Grenoble, 1451; Bordeaux, 1462; Burgundy, 1497 (established in Dijon, 1494); Aix, 1501; Rouen, 1499 and 1515; Rennes, 1553; Pau, 1620; Metz, 1633; Besançon (at first at Dôle), 1676; Douai (at first at Tournay), 1713. The chief officers of these bodies were a first president and nine presidents *à mortier*, as they were called from the shape of their caps. The parliaments received appeals from the lower tribunals, and had jurisdiction over causes relating to peers, bishops, seneschals, chapters, communities, and bailiwicks; and they registered the laws, edicts, and orders promulgated by the king. The members of these courts were at first appointed by the crown. Francis I. introduced the practice of selling seats in them, and they continued thenceforth to be objects of purchase. The parliament of Paris, which was at first merely judicial, gradually assumed a considerable degree of political power. It frequently refused to register laws which it did not approve, and held spirited contests with the crown on some occasions. But the king had the right to compel it to register his decrees by appearing in person in the court and giving the order to register, a proceeding which, from some of the attendant forms, was called holding a bed of justice. The parliament of Paris played an important part in the troubles of the Fronde at the beginning of the reign of Louis XIV., and also in the latter part of the reign of his successor. It was finally suppressed, with all the other parliaments of France, by a decree of the constituent assembly, Sept. 7, 1790.

PARLIAMENTARY LAW AND PRIVILEGES. In the gradual establishment of parliamentary government in England the customary methods of doing business by the two houses have resulted in rules of procedure which constitute a common law of parliament, and are recognized and enforced as obligatory. These rules supplement the written laws of parliamentary procedure much as the general common law of the land supplements the general statutes. At the same time certain privileges necessary to the proper independence of the legislature and to the free and unobstructed discharge of legislative duties have also become established, which are defined by the same customary law, and evidenced by parliamentary precedents. Among the most important of these privileges is that of each house to judge of the election and qualification of its own members. The house of commons cannot therefore intermeddle with questions concerning the election or qualification of Irish or Scotch peers, neither will it permit the house of lords to question its own action in the admission or rejection of those claiming seats therein. Until the accession of the house of Stuart to the throne it was not very definitely settled what authority, if any, the executive had to prescribe the qualifications of members to the lower house, or to judge of the returns; but James I. having undertaken by the writs issued for his first parliament to exclude bankrupts and outlawed persons, the house insisted upon its own right in the premises as being ample and exclusive, and admitted Sir Francis Goodwin, who had been outlawed in civil proceedings, and whom for that reason the sheriff had refused to return. Although the controversy with the king that sprung up in consequence was finally determined by a compromise, the case is regarded as having settled the right beyond dispute. Another privilege is that of the members to exemption from arrest or detention on the process of courts during attendance upon its sessions, and for a reasonable time before and after the session for going to and returning from the same. This privilege extends to all civil process including subpœnas *ad testificandum*, and to all criminal process except on charges of treason, felony, or breach of the peace. Another privilege is that of complete exemption of the members from being questioned elsewhere for words uttered in debate or as members of committees in the discharge of their duties. This, like the last, is the privilege not of the individual members alone, but of the house itself; and any violation of it, whether by means of judicial process or by lawless violence, may be punished as a contempt of the house. Each house has also a right to judge of its own privilege, and in general its decision must be final, though it is quite possible that parliament, like any judicial tribunal, even the highest, may so clearly exceed its jurisdiction that its process may be treated as a nullity. Such a case was adjudged to have arisen a few years ago, when the house of commons proceeded to punish sheriffs as for contempt in executing the process of courts in a suit brought against its printer for an alleged libel. The libel was contained in a report made to the house, and that body insisted upon its right to cause its publication, and to protect those who should make it in obedience to its order. The courts, however, denied that the publication of a libel could be justified on the order of the house, and discharged the sheriff from custody; but an act was at once passed which established the privilege the house had insisted upon. The English courts have also held that though a member was privileged in his utterances in the house, yet if his speech was libellous and he afterward published it for general distribution, this publication was not privileged. Another privilege of each house is to protect itself against anything calculated to impede or disturb the regular course of legislation. Disorder during one of the sessions might be such an impediment, and so might be the attempt to bribe a member, or to influence his action by threats. So also might be the refusal of a witness to give evidence before a committee, or the divulging by a member of any of the secrets of the house in violation of its injunctions, or an attempt to influence the action of the house by reporting the opinion or pretended opinion of the executive on any measure or proceedings pending therein. To enumerate all the privileges of parliament is something it has never attempted for itself. Blackstone says: "Privilege of parliament was principally established in order to protect its members not only from being molested by their fellow subjects, but also more especially from being oppressed by the power of the crown. If therefore all the privileges of parliament were once to be set down and ascertained, and no privilege to be allowed but what was so defined and determined, it were easy for the executive power to devise some new case, not within the line of privilege, and under pretence thereof to harass any refractory member, and violate the freedom of parliament." And these privileges can only be preserved intact by ample authority in parliament to punish all breaches thereof under its own regulations and by the aid of officers subject to its own exclusive control.—The customary law of parliament has been tacitly adopted in this country, and its leading rules and principles were embodied and illustrated in a manual by Mr. Jefferson, prepared by him while presiding officer of the senate, and which has been a standard authority ever since, though in a measure superseded by the more elaborate work of Mr. L. S. Cushing on the "Law and Practice of Legislative Assemblies." So much importance is attached to legislative privileges in this country, and so imperative the necessity to protect them against encroachments from any quarter, that the leading privileges are usually declared by constitution; but without such declaration all customary privileges are covered by the constitutional principle which recognizes and protects the independence of each department of the government within the sphere of its proper action.—Without express adoption, the congressional rules of order and procedure are understood as in force for all deliberative bodies, except as changed by their own voluntary action or other competent legislation. Even political conventions and voluntary associations of every nature, when acting as organized bodies, are expected to recognize and obey the same rules, unless provided with a code of their own. Thus in an American assembly having no special rules for conducting business, the motion to adjourn would be undebatable as in congress, notwithstanding the English parliamentary law to the contrary; so if the previous question were negatived, the debate upon the subject would continue as in congress, whereas in parliament the subject would be immediately dismissed. An assembly should be organized by the election of at least two officers: 1, a chairman or president, whose duty it is to preside, to announce the business in its order, to state and put all questions properly brought before the assembly, and to preserve order and decorum and decide all questions of order (subject to an appeal), and who can vote in case of a ballot or where his vote would affect the result; 2, a clerk or secretary, whose duty it is to keep the record of the proceedings and to have the custody of all papers in the possession of the assembly. It is a common practice in political meetings to organize temporarily, and then refer the subject of permanent organization, selection of officers, &c., to a committee, upon whose report the meeting organizes. It is not unusual to elect one or more vice presidents and several secretaries. In some legislative bodies, as the senate of the United States and some of the state senates, the presiding officer is not a member; in others, as the national house of representatives and the senate of Massachusetts, he is chosen by and from among the members. A quorum of members is necessary to the transaction of business. The number requisite to a quorum is usually fixed by law; if not, a majority of the members of the assembly is essential. Business is brought before the assembly either by a communication to it or by a motion of a member. In order to make a motion, it is necessary for the member to rise and address the chairman by his title, and for the chairman to recognize him, which is usually done by announcing his name; if required by the chairman, the motion must be in writing. When made it must be seconded by another member to entitle it to any notice; when it is seconded, the chairman states the question to the assembly, and it is then formally before the body to be disposed of as they see fit. In order to dispose of the question properly, various motions have come into use, which can be classified as follows: 1. To modify. If it is desired to modify the question in any way, the proper motion to make is to amend either by adding words, by striking out, or by striking out certain words and inserting others, or by substituting a different motion on the same subject, or by dividing the question into two or more questions which the mover specifies, so as to get a separate vote on any particular point. When this motion to amend has been made, seconded, and stated by the chairman, it takes the place for the time being of the original question, and debate must be confined to its merits. This amendment can itself be amended, but the amendment of an amendment cannot be amended. If the original question needs more amendment than can well be made in the assembly, it is then moved to refer it to a committee, and this motion can be made even while an amendment is pending. 2. To defer action. When it is desired to defer action upon the question till a particular time, a motion is made to postpone the question to that time; it can be made when either of the previous motions is pending, and can be amended by altering the time. A motion that a question lie on the table is used when it is desired to lay the question aside temporarily and at the same time retain the privilege of taking it up at any moment. This motion is frequently used to destroy or "kill" a measure when it is known that a sufficient vote cannot be obtained to take it up during that session. It can be made when any of the previous motions are pending. 3. To suppress debate. The usual method of stopping debate is for a friend of the measure to call for the previous question, which if ordered brings the assembly at once to a vote on the questions before it, in their order, until the main question is finally disposed of. If any one of the following motions is pending, the previous question is exhausted by the vote on it, and does not cut off debate on any other motion that may be pending, viz.: to postpone to a certain time, to postpone indefinitely, to reconsider, and an appeal. The chairman states this question as follows: "Shall the main question be now put?" If it fails, the debate continues. Other methods of stopping debate are to adopt motions limiting the time allowed each speaker or the number of speeches on each side, or to appoint a time at which debate must cease and the question be put. In ordinary societies, where harmony is important, a two-thirds vote is usually required for the adoption of any of the above motions to cut off debate. 4. To suppress the question. As soon as a motion is introduced, before it has been debated, and only then, any member can object to the consideration of the question; this requiring no second, the chairman instantly puts the question, "Will the assembly consider it?" or, "Shall the question be discussed?" and if negatived the question is dismissed for the session. In ordinary meetings whose sessions are short, and where but few subjects can be considered, this motion is necessary to suppress irrelevant, useless, or contentious questions. But it should require a two-thirds vote to suppress a question without debate. In congress the question is put as follows: "Will the house now consider it?" and a negative vote dismisses the question for the time. The motion to postpone indefinitely is the usual one to suppress a question for the whole session, and the only one available after the question has been debated. It cannot be made while any motion is pending except the original or main question, and yields to all other motions mentioned except to amend. A motion to lay on the table is often used for this purpose, and, if there is no possibility of obtaining during the session a sufficient vote to take it from the table, it is the preferable one because of its high rank and its being undebatable. 5. To consider a question a second time. When a question has been once adopted, rejected, or suppressed, it cannot be again considered in the same session except by a motion to reconsider; and this motion can only be made by one who voted on the prevailing side and on the day the vote was taken which it is proposed to reconsider. In congress it can be made on the next day, and if the yeas and nays were not taken on the vote it can be made by any one. It can be made and entered on the record in the midst of debate, even when another member has the floor; but it cannot be considered until there is no question before the assembly, when, if called up, it takes precedence of every motion except to adjourn and to fix the time to which to adjourn. The rule prohibiting the renewal of a motion does not apply to the motion to adjourn, which can be renewed if there has been mere progress in debate. The subsidiary motions already described can be again introduced if the question has changed in either matter or form. 6. Order and rules. If the assembly has directed that certain questions shall be considered at a certain time, when that time arrives any member can call for the order of the day; and as it requires no second, the chairman must at once put the question whether the assembly will now take up the order of the day; if it is carried, the subject under consideration is laid aside, and the questions appointed for that time are taken up in their order. But where there is a rule adopted, it must be enforced by the chairman without any question, and a motion to suspend the rules for a particular purpose must be adopted by a two-thirds vote in order to allow that particular thing to be done if it conflicts with the rules. It is the duty of the chairman to announce the business in its order, to enforce the rules, and preserve order; and when any member notices a violation of order, he can call for the enforcement of the rules. While in all such cases the chairman first decides the question, any member can appeal from his decision; and if the appeal is seconded, the chairman states the question thus: "Shall the decision of the chair stand as the judgment of the assembly?" The chairman can speak to the question without leaving the chair, which is prohibited in all other cases. 7. Miscellaneous. If a speaker wishes to read a paper, or a member to withdraw his motion after it has been stated by the chair, it is necessary, if any one objects, to make a motion to grant permission. 8. To close the meeting. If it is desired to have an adjourned meeting of the assembly, it is best some time before its close to move to fix the time to which the assembly shall adjourn. The question is of this form: "That when this assembly adjourns, it adjourn to meet," &c., specifying the time. A motion to amend by altering the time can be made. This motion takes precedence of all others. When it is desired to close the meeting, a member moves to adjourn, which, if unqualified, takes precedence of every motion but the preceding one. —Debate must be confined to the question before the assembly, the remarks being always addressed to the chairman and personalities avoided. The following motions are undebatable; and excepting the first one they, together with the motion to postpone indefinitely, cannot be amended: to fix the time to which to adjourn; to adjourn, when unqualified; a call for the order of the day; questions relating to the priority of business, or withdrawing a motion, or reading papers, or suspending the rules; an appeal, if it relates merely to indecorum or transgressions of the rules of speaking, or if made while the previous question is pending; an objection to the consideration of a question; to lay on the table, and to take from the table; the previous question; and to reconsider a question which is itself undebatable. All other questions are debatable, but debate is very limited on the motion to postpone to a certain time, being confined to the propriety of the postponement; while on the other hand the motions to commit, to postpone indefinitely, and to reconsider a debatable question, open for discussion the entire merits of the original question.—In regard to precedence, the ordinary motions rank as follows, and any motion, except to amend, can be made while one of a lower order is pending, but none can supersede one of a higher order: to fix the time to which to adjourn; to adjourn, when unqualified; a call for the order of the day; to lay on the table; the previous question; to postpone to a certain time; to commit, amend, or postpone indefinitely. The privilege of a reconsideration has been explained under that motion. The other motions are incidental to any question, and take precedence of and must be decided before the questions which gave rise to them.—In order to facilitate business, it is customary in all deliberative assemblies to form committees, whose duty it is to consider and report upon the subjects referred to them. The members are usually appointed by the presiding officer, but are sometimes elected by the assembly. Sometimes the assembly resolves itself into a committee of the whole for the consideration of a particular subject. In this case the chairman is usually named by the presiding officer of the assembly, but he may be chosen by the committee.—In the ordinary course of legislation in congress, a bill is introduced into the house of representatives or senate, on the report of a committee, or on motion for leave by a member after having given at least one day's notice. It must then be read three times on as many different days, unless it is otherwise specially ordered. Usually, however, the second reading immediately follows the first, it being taken for granted that it is by special order. After the second reading the merits of the bill are usually discussed, and it is determined whether it shall be referred to a committee, amended, or engrossed. If ordered to be engrossed, a day is appointed for the third reading. Having been read a third time, the question is whether the bill shall be passed. The second and third readings are commonly effected by simply reading the title. If the bill pass, it is certified by the clerk and sent to the other house. Having been passed by that body, it is enrolled on parchment, examined by a joint committee of two from each house, signed by the speaker of the house and the president of the senate, presented to the president of the United States, and upon receiving his signature becomes a law. If it is vetoed, it is returned to that house in which it originated, and by receiving a two-thirds vote of each house will become a law without the executive approval. If not returned by the president within ten days (Sundays excepted) after presentation to him, it becomes a law, unless congress by adjournment prevent its return. The procedure in regard to the progress of a bill is generally the same in the state legislatures.—See Cushing's "Manual" (1847); "Digest of Rules and Practice of the House of Representatives of the United States," by I. M. Barclay (1868); "Digest of Parliamentary Law," by O. M. Wilson (1869); "The Pocket Manual of Rules of Order for Deliberative Assemblies," by H. M. Robert (1875); and "Warrington's Manual," by W. S. Robinson (Boston, 1875).

PARMA. I. A N. province of Italy, in the Emilia, separated N. by the Po from Cremona, E. by the Enza from Reggio, S. by the Apennines from Massa e Carrara and Genoa, and bounded N. W. by Piacenza; area, 1,251 sq. m.; pop. in 1872, 264,381. More than half the province is covered by ridges of the Apennines, some of the mountains being over 6,000 ft. high; one fifth of the territory is hilly, and the rest consists of fertile plains. The principal rivers are the Po and its affluents the Taro and Enza. The agricultural products, though considerable, are not quite sufficient for the population. The most abundant productions are wine, oil, fruits, rice, timber, marble, alabaster, copper, and salt. The principal manufacture is of silk. Dairy products, particularly the celebrated Parmesan cheese, are largely exported. The province comprises the districts of Parma, Borgo San-donino, and Borgotaro.—Under the Romans, who subdued this territory in 184 B. C., it formed part of Cisalpine Gaul. After the fall of the western empire it was held successively by the Ostrogoths, the Longobards, and by Charlemagne, who ceded it to the pope. It became independent during the wars between the holy see and the German emperors, and afterward passed under the dominion of local dynasties, until in 1346 it fell into the hands of the Visconti of Milan. In 1511 the congress of Mantua restored it to Pope Julius II. After being for a while occupied by the French under Francis I., it was in 1545 bestowed by Pope Paul III. upon his natural son Pietro Luigi Farnese, whose successors held the duchies of Parma and Piacenza till 1731, when the male line became extinct. Elizabeth Farnese, the wife of Philip V. of Spain, now obtained the duchies as a fief for her son Don Carlos; but when he became king of the Two Sicilies they were annexed to Austria. The treaty of Aix-la-Chapelle (1748) gave the duchies, along with Guastalla, to Don Philip, brother of Don Carlos. Philip was succeeded in 1765 by his son Ferdinand, who was permitted to retain the territories even after the French invasion and until 1801, when the treaty of Lunéville gave to his son Louis the grand duchy of Tuscany and the title of king of Etruria, instead of his father's duchies. On Ferdinand's death in 1802, France incorporated them under the name of the department of the Taro, although the formal annexation of Parma and Piacenza was not effected till July, 1805, and in 1806 Guastalla was annexed to the French kingdom of Italy. The three duchies were bestowed in 1814 upon the ex-empress of France Maria Louisa. To meet the objections of Spain a separate treaty (June, 1817) vested the succession to the duchies on Maria Louisa's death in the descendants of the infanta of Spain (the queen of Etruria), who in the interval became ruler of Lucca; but after the extinction of the house of Lucca the duchy of Piacenza was to revert to Sardinia and Parma to Austria, which latter power was in the mean time authorized to retain all the territory on the left bank of the Po and to garrison the fortress of Piacenza. Maria Louisa left Parma in consequence of the revolutionary movements in 1846, and after her death in December, 1847, Duke Charles of Lucca reigned in Parma and Piacenza till the revolution of 1848, when the country was for a short time occupied by Sardinian troops. The defeat of Charles Albert soon restored the duke, who resigned in favor of his son Charles III. in 1849. The latter was assassinated in March, 1854, and his minor son Robert succeeded him under the regency of his mother, a sister of the count de Chambord, whose administration was not unpopular. The victories of the allied French and Sardinians in 1859 put an end to the rule of the house of Lucca. Parma and Piacenza became part in 1860 of the kingdom of Sardinia, and in 1861 of that of Italy, forming now two distinct provinces. (See Farnese.) **II.** A city, capital of the province, 12 m. S. of the Po and 70 m. S. E. of Milan; pop. in 1872, 45,511. The river Parma passes through the city, and is crossed by three bridges. Parma is divided into two almost equal parts by the Via Æmilia. The most celebrated building is the Farnese palace, containing a large theatre and the academy of sciences, valuable collections, and a library with 140,000 volumes. In a hall of the library is one of Correggio's frescoes. The palace contains also a museum of antiquities and the public printing establishment, where more than 50,000 of Bodoni's models of types are preserved. There are three other notable palaces in the city. The cathedral is an imposing edifice in the Lombard style, with Correggio's "Assumption of the Virgin" and other fine works. The church of Madonna della Steccata is built after the model of St. Peter's, and contains "Moses" and other paintings by Parmigiano, and tombs of the Farnese family. San Giovanni Evangelista has also good works of art. The baptistery, built between 1196 and 1281, is one of the most splendid in Italy; it is built entirely of red and gray Veronese marble, is encircled with four tiers of open galleries outside, and has a painted dome. The university contains an observatory and cabinet of natural history. It was attended in 1875 by upward of 800 students. A superior school of engraving was established in 1860. In the S. E. part of the city are the citadel and the botanic gardens. Parma is a city of palaces and beautiful gardens, but singularly lifeless except during the annual fair in June for the sale of silk, the principal article of trade.—The construction of the Via Æmilia gave to Parma some importance under the Romans, but it was devastated by Mark Antony in 43 B. C. A settlement of Goths was formed here by Gratian in A. D. 377. During the middle ages it rose to importance among the capitals of Italy, and it was exceedingly brilliant under some of the princes of the house of Farnese. Petrarch resided here in 1341-'2, and Amadio Ronchini published on occasion of the celebration of the poet's anniversary in 1874 *La dimora del Petrarca in Parma* (Modena, 1874).

PARMA, Alessandro Farnese, duke of. See Farnese.

PARMEGIANO. See Parmigiano.

PARMENIDES, a Grecian philosopher, born in Elea in Italy about 513 B. C. He was the instructor of Empedocles and Zeno. He went to Athens at the age of 65, and Plato called him "the great," and Aristotle deemed him the chief of the Eleatics. His philosophical opinions (see Eleatic School) are embodied in a hexameter poem "On Nature," fragments of which have been published by Fülleborn (Zürich, 1795), by Peyron (Leipsic, 1810), and by Karsten in *Philosophorum Græcorum Veterum Reliquiæ* (Brussels, 1835).

PARMENIO, a Macedonian general, born about 400 B. C., killed in 330. He was the favorite of Philip of Macedon. He defeated the Illyrians in 356, upheld the Macedonian influence in Eubœa in 342, and in 336 was sent with an army into Asia. When Alexander invaded Asia, he was made second in command, and led the left wing in the battles of the Granicus, Issus, and Arbela. While the king was pursuing Darius in Parthia and Hyrcania, he completed the subjugation of Media; but in the mean time his son Philotas was accused of conspiring against Alexander's life, and when put to the torture implicated his father. Alexander caused the veteran to be assassinated.

PARMIGIANO, or **Parmigianino**, an Italian painter, whose real name was Francesco Mazzuola, or Mazzola, born in Parma in 1503 or 1504, died in Casal Maggiore, Aug. 24, 1540. In his 16th year he produced a picture of the "Baptism of Christ." His first works were in the style of Correggio. In his 20th year he went to Rome, where Clement VII., Cardinal Ippolito de' Medici, and others employed him, and in 1527 he painted his "Vision of St. Jerome," now in the British national gallery. In the same year, after the sack of Rome by the constable de Bourbon, he took refuge in Bologna, where his best works were produced. Among these were the *Madonna della rosa*, in the Dresden gallery; the *Madonna del collo lungo*, in the Pitti palace; and the famous altarpiece, now in the gallery at Bologna, called the *Santa Margherita*. In 1531 Parmigiano returned to his native city, and was commissioned to execute a series of frescoes in the church of Santa Maria della Steccata, which after a delay of several years he began but never finished. Among the figures completed is a celebrated one of Moses breaking the tables of the law. For his failure to execute these frescoes, for which he had received a sum in advance, he was thrown into prison, but he escaped into the neighboring territory of Cremona, where he died.

PARNASSUS, in ancient geography, a mountain range of central Greece, which commenced near Œta and Corax, and, traversing Doris and Phocis in a S. E. direction, terminated at the Corinthian gulf. In a more restricted sense the name is applied only to the highest part of the range, which lies a few miles N. of Delphi in Phocis, and culminates in Mt. Lycorea (now Liakura, 8,068 ft. high). Its sides are well wooded and abound in caverns and picturesque ravines. Snow lies on the summit the greater part of the year. Apollo and the Muses were said to make this mountain their favorite haunt, and the latter held here their assemblies. The Castalian spring, in which the Pythia used to bathe, sprang from a cleft in the rocks between two of the summits. The Corycian cave, sacred to Pan and the Muses, was on Mt. Lycorea. Parnassus was also sacred to Bacchus, and the theatre of the Bacchanalian revels of the Thyades.

PARNELL, Sir **Henry Brooke**. See CONGLETON.

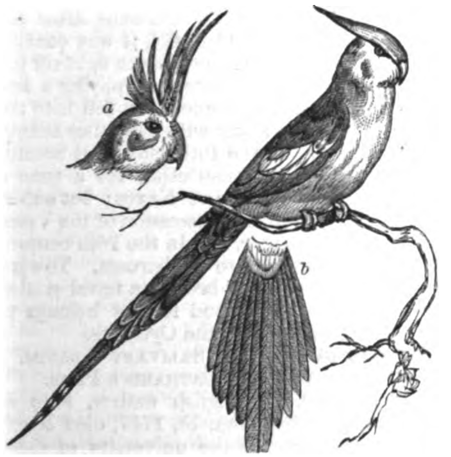
PARNELL, Thomas, an Irish poet, born in Dublin in 1679, died in Chester in July, 1717. He was educated in the college of Dublin, took holy orders in 1700, and was created archdeacon of Clogher in 1705. He spent most of his time in England. With Pope, Swift, Arbuthnot, and Gay he was united in the closest friendship, and was a member of the famous Scriblerus club. He assisted Pope in his translation of Homer, and wrote the life of Homer prefixed to the Iliad. His only other considerable prose composition was a satire on Dennis and Theobald, under the title of "A Life of Zoilus." Archbishop King gave him a prebend in 1713, and in May, 1716, presented him to the vicarage of Finglass, in the diocese of Dublin. A selection from his poems was published by Pope in 1722, and a supplementary volume, the authenticity of which is questioned, appeared in 1758. The "Allegory on Man," "The Hermit," "A Fairy Tale, in the ancient English Style," "Hesiod, or the Rise of Women," and a translation of Hòmer's "Battle of the Frogs and Mice," are among his happiest productions. His life was written by Goldsmith.

PARNY, Évariste Désiré Desforges, chevalier de, a French poet, born in St. Paul, island of Bourbon, Feb. 6, 1753, died near Paris, Dec. 5, 1814. He went to France to study for the church, but became a soldier. In 1773, returning to his native island, he fell in love with Esther de Baïf, whom he celebrated under the name of Éléonore. His father opposing the marriage, he went to Paris and devoted himself to literature. In 1777 he published his *Voyage en Bourgogne*, and a semi-satirical poem, *Épître aux insurgents de Boston*. This was followed in 1778 by his first collection of erotic poems. In 1785 he went to India as aide-de-camp to M. de Souillac, governor general of the French possessions. Returning with despatches, he retired to Feuillancourt, near Paris, where he wrote *Les fleurs*, *La journée champêtre*, *Les douze tableaux*, and other poems. In 1795 he was appointed to a subordinate office in the department of public instruction, and for one year held the post of administrator of the *théâtre des arts*. His later poems were remarkable for their wit and obscenity. He was admitted to the French academy in 1803. Français de Nantes gave him an office in the administration of the *droits réunis*, and Napoleon bestowed upon him a pension of 3,000 francs. His complete works were published in Paris (5 vols. 18mo, 1808) and Brussels (2 vols. 8vo, 1826); selections, with notice of his life and writings by Tissot (Paris, 1826); and *Élégies et poésies diverses*, with preface by Sainte-Beuve (1862).

PAROL (Norman Fr., a spoken word), as an adjective, in law, by word of mouth, not written. (See CONTRACT, EVIDENCE, and FRAUDS, STATUTE OF.)

PAROPAMISAN MOUNTAINS, or **Paropamisus**, a name formerly generally applied to a western portion of the Hindoo Koosh range in central Asia. (See HINDOO KOOSH.) It is of very ancient origin, having been used before the time of Alexander; but its application in ancient works is very indefinite, and there is a considerable difference of opinion among modern geographers as to what part of the western Hindoo Koosh it properly designated. On the best maps it appears as the name of the range along the N. boundary of Cabool, the N. E. district of Afghanistan, and extending from the pass of Khawak on the east to the peak of Koh-i-baba on the west; and it is also applied to the more northerly of the two branches into which the main range divides still further westward. Many of the best classicists believe the name to have been used for the whole chain now known as the Hindoo Koosh, and some receive it as the designation of all the mountain group between the Caucasus and the Himalaya.

PAROQUET, or **Parrakeet**, the common name of many old-world parrots of the subfamily *pesoporinæ*. They all have a moderate bill, the tail long, broad, and more or less graduated, with the ends of the feathers narrowed, the tarsi generally high and slender, and the claws nearly straight, enabling them to walk upon the ground more easily than the other subfamilies. In the Australian genus *nymphicus* (Wagl.) the bill is strongly dentated, the wings and tail very long, the two middle feathers of the latter prolonged and pointed, and the tarsi stout. The crested paroquet (*N. Novæ Hollandiæ*, Wagl.) is of an elegant form and grayish color, with the sides and top of the head bright yellow, a reddish orange spot below the eye, and a handsome yellow crest like that of the lapwing; they are migratory, at times collecting in large flocks, and much upon the ground picking up seeds and grains; they breed in holes in gum trees (*eucalypti*) in the neighborhood of water, depositing five or six eggs.—The broad-tailed paroquets (*platycercus*, Vig.) of Australia, New Zealand, and New Guinea, are very elegant, graceful, and lively, with diminished powers of flight and climbing and more activity upon the ground; the bill is short and curved, with obtuse tip and sides very slightly if at all dentated; the wings moderate, and the tail broad and long. They are usually seen in flocks upon the ground, and sometimes do much damage both to the newly sown and ripening maize and wheat. The nonpareil paroquet (*P. eximius*, Shaw) is one of the handsomest of the family, having the head, neck, and breast scarlet, wings mazarine blue, throat and abdomen yellowish white, back undulated with blackish and yellowish green, and tail blue. More than 30 other species of this genus are described.—The ground paroquet (*pezoporus*, Illig.) is the most terrestrial of the family, as evinced by the greater elongation of the tarsi and toes, the straighter claws, and the less depressed and more pointed tail. The *P. formosus* (Illig.) inhabits the bushy districts of Australia; it is about a foot long, of a lively green color, varied and barred with black and yellow; it lives entirely upon the ground, where it runs with great speed.—Among the handsomest of the subfamily are the ringed paroquets (*palæornis*, Vig.), which have a short rounded bill, sharp-pointed, and the tail long and graduated, the two middle feathers longest; they are remarkable for the elegance of their form, their docility, and powers of imitation; most of the species are found in India and its archipelago, and may be known by the collar-like ring around the neck. The Alexandrine paroquet (*P. Alexandri*, Vig.) was so named from the supposition that it was the one brought to Europe by Alexander the Great; it is about 15 in. long, green above, paler or yellower below; across each shoulder is a purplish red patch; a black band from the lower mandible descends and passes backward so as almost to encircle the neck, growing narrowest behind, where there is a red collar becoming narrowest in front; the bill reddish. This bird was well known to the Greeks and Romans, who kept it in highly ornamented cages; it is mentioned by Aristotle and Pliny, and Ovid has described it in one of his most beautiful elegies (on the death of Corinna's parrot). There are about a dozen other species in India, associating in flocks, and often



Crested Paroquet (Nymphicus Novæ Hollandiæ).
a. Head, with crest erect. *b.* Tail spread.

Alexandrine Paroquet (Palæornis Alexandri).

doing mischief to the crops; they are all docile, imitative, and handsome.—The grass paroquets (*melopsittacus*, Gould) of Australia are remarkable not only for the beauty of their plumage but for their pleasing song; the bill is very short and high, the tail graduated and cuneiform, the tarsi long, and the toes slender. They pass most of their time on the ground, migrating with rapid flight from place to place in large flocks in search of grass and other seeds; during the heat of the day they remain concealed in lofty trees; they are often kept in cages, where their beauty, song, and gentle and loving habits make them pleasing pets. In the allied genus *nanodes* (Vig. and Horsf.) or *euphema* (Wagl.), also Australian, are about half a dozen elegant little grass paroquets, with habits like those of the preceding genus. —The genus *trichoglossus* (Vig. and Horsf.), which seems to connect this subfamily with the lories, hence called "lorikeets," takes the place in Australia of the Indian lories, and contains some of the most beautiful of the parrot family; the prevailing color of the plumage is green, varied with scarlet, blue, and yellow; the tail is elongated and graduated, and the wings are narrow and pointed; the bill is slender and weak, but arched and hooked; the tarsi short and robust, and the strong and broad toes armed with sharp claws; the generic name is derived from the structure of the tongue, which has near the tip a pencil or brush of hair-like bristles, especially adapted for procuring the nectar of flowers, which forms their principal food; they also suck the juices of soft fruits, but do not attempt the hard seeds of which most parrots are fond. The blue-bellied paroquet (*T. multicolor*, Vig. and Horsf.) is about 13 in. long, of which the tail is 6; the head and throat are bluish purple, with a nuchal collar of bright green; breast vermilion red, passing on the sides into rich yellow; abdomen deep purple in the middle, vermilion tipped with green on the sides; under tail coverts red, yellow, and green, and under wing coverts red; upper parts grass-green, varied with vermilion and yellow on the back of the neck; tail green in the middle, with more or less yellow on the sides. They live in large flocks, moving from place to place in search of the newly expanded flowers of the gum trees; they are sometimes caged, but do not live long in confinement from the difficulty of supplying them with proper food.

PAROS, or **Paro**, an island of Greece, in the Archipelago, one of the Cyclades, separated from Naxos or Naxia on the east by a strait 5 m. wide; length N. E. and S. W. 14 m., greatest breadth 11 m.; area, 80 sq. m.; pop. about 6,000. Its highest point, Mount St. Elias, is 2,530 ft. above the sea. There are several harbors, Parikia on the west, St. Maria, Marmora, and Trio on the east, and Naussa on the north, the best in the Archipelago. There are also several villages, of which the principal is Parikia, on the site of the ancient Paros. The country, though hilly, is fertile, and produces principally olives and cotton, and also corn, wine, fruit, and legumes. In former times it was celebrated for its marble, which was remarkably white and durable, and was considered second only to that of Pentelicus. The principal quarries were in Mount Marpessa.—Paros, according to tradition, was first inhabited by Cretans and Arcadians, and obtained its name from Parus, a son of the Arcadian Parrhasius. It was early colonized by the Ionians, and by means of its maritime trade became so prosperous that it colonized Thasos, Parium on the Propontis, and Pharus on the Illyrian coast. Having submitted to the Persians after the battle of Marathon (490 B. C.), it was enabled to defy Miltiades, and after the sea fight off Salamis (480) secured its safety by paying a fine to Themistocles. Subsequently it fell into the power of Athens, along with the other islands of the Ægean. In the 13th century it became subject to Venice, constituting for a time a portion of the dukedom of Naxos; but subsequently it came into the possession of the Venetian family of Venier, and in the 16th century was taken by the pirate Barbarossa. Toward the close of the 18th it became a naval station for the Russian fleet, and it now belongs to the Greek nomarchy of the Cyclades.

PAROTID GLAND. See SALIVARY GLANDS.

PARR, Catharine. See CATHARINE PARR.

PARR, Samuel, an English author, born at Harrow-on-the-Hill, Jan. 15, 1747, died March 6, 1825. He entered the university of Cambridge in 1765, but the death of his father obliged him to accept in 1767 the post of first assistant master of Harrow school, and he remained there five years, when he opened a private school at Stanmore. In 1777 he became master of the school at Colchester, and was ordained priest, receiving the curacies of Hythe and Trinity church. In the following year he was appointed master of Norwich school. His first noteworthy publication was his "Discourse on Education, and on the Plans pursued in Charity Schools" (1785). In 1786 he removed to Hatton in Warwickshire, where he held a perpetual curacy, and here he passed the remainder of his life, engaged in literary pursuits, the care of his parish, and the instruction of children. He was arrogant and quarrelsome, and an ardent whig at a time when whiggism was very unpopular with the ruling classes. He is said to have surpassed in conversational powers all his contemporaries except Dr. Johnson. In 1787 he published an edition of *Bellendenus de Statu*, with a celebrated political preface in Ciceronian Latin. His other writings comprise a controversy with Dr. White, whom he accused of plagiarism in his "Bampton Lectures" (1790); papers connected with the Birmingham riots of 1791; a controversy with Dr. Charles Combe in 1795; one with Godwin and others occasioned by Parr's Spital sermon in 1800; and "Characters of the late Charles James Fox" (1809).

An edition of his works, with a memoir and selections from his correspondence, was published by John Johnstone, D. D. (8 vols., London, 1828).

PARR, Thomas, commonly known as Old Parr, an English centenarian, born at Winnington, Shropshire, in 1483, died in London, Nov. 15, 1635. He was the son of poor parents, and after his father's decease continued his occupation of husbandry. It is related in his biography that he was first married at the age of 80, and begot two children; and after the death of his wife, he married again when about 120 years old. According to a current story, he was engaged in a love intrigue when about 105 years old, and was compelled to do penance for the crime by standing in a sheet in Alderbury church. When a little over 152 years old, he was taken to London by Thomas earl of Arundel, but soon died, and was buried in Westminster abbey. The common traditions with regard to him, which have been called in question by recent writers, are derived from a pamphlet published in 1635 by John Taylor, under the title of "The Olde, Olde, Very Olde Man; or, the Age and Long Life of Thomas Parr, the Sonne of John Parr, of Winnington, in the Parish of Alderbury, in the County of Salopp, who was born in the reign of King Edward the IVth, and is now living in the Strand, being aged 152 years and odd monthes. His manner of life and conversation in so long a pilgrimage; his marriages, and his bringing up to London about the end of September last, 1635."

PARRHASIUS, a Greek painter, born in Ephesus, flourished about 400 B. C. He was the son and pupil of Evenor, and, although belonging to the Ionian school of art, passed the greater part of his life in Athens. He established certain canons of proportion for the human figure which were adopted by succeeding artists; and Pliny says: "He first gave to painting true proportion, the minute details of the countenance, the elegance of the hair, the beauty of the face, and by the confession of the artists themselves obtained the palm in his drawing of the extremities." In epigrams inscribed on his own productions he called himself 'Αβροδίαιτος, the elegant, claiming a divine descent, and announcing that in his works the art of painting had reached its highest excellence. His most celebrated work was an allegorical representation of the Athenian people, in which every quality, good or bad, ascribed to the Athenians, found its expression. Among other famous works by him were a Theseus, "Ulysses feigning Insanity," a Meleager, Hercules, &c. He also painted pictures of a gross and licentious character, two of which, the "Archigallus" and the "Meleager and Atalanta," were so highly prized by the emperor Tiberius that he caused them to be hung in his own chamber. The story told by Seneca, that Parrhasius, when painting a "Prometheus Chained," put an Olynthian captive to the torture to obtain the proper expression of bodily suffering, is unfounded.

PARROT, the general name of the *psittacidæ*, a family of scansorial birds, remarkable for the elegance of their form, the brilliancy of their plumage, and their docility and power of imitating the human voice. They have a large strong bill, much arched, with acute tip, and the lower mandible notched at the end; the upper mandible is movably articulated to the frontal bones, enabling them to seize larger objects than other birds of their size; the tongue is thick and fleshy, the wings and tail generally long, tarsi short and robust, and the strong toes directed two before and two behind, the former united at the base by a narrow membrane. These are the typical climbers, but are slow and generally awkward on the ground; they use both bill and claws in climbing, and while feeding use one foot to hold their food; though rather sedentary, most of them are good fliers; the neck is short, and has usually 12 vertebræ; the sternum is long and narrow, with generally an oval aperture on its inferior margin on each side; the structure of the tongue and the complicated lower larynx enable them to articulate with great distinctness. They are confined to the warm parts of America, Asia, Africa, and Australia, and generally to the southern hemisphere; their food consists of soft pulpy fruits, especially such as have hard kernels or seeds; they are usually seen in large flocks, active in the morning and evening, noisy and quarrelsome, destructive to vegetation in their wild state, and very mischievous in captivity; they are monogamous, and build their nests generally in hollow trees. This is a very extensive family, numbering about 300 species, and divided by Gray into the subfamilies of *pezoporinæ*, *arainæ*, *lorinæ*, *cacatuinæ*, and *psittacinæ;* the first four are described respectively under the titles Paroquet, Macaw, Lory, and Cockatoo, leaving for this article only the *psittacinæ*, and the genus *conurus* of the macaws. Some of the parrots present raptorial characters in the form of the bill, and especially in its soft skin or cere. Bonaparte makes of them a distinct order, placing them at the head of his system, separated from the typical *scansores* by the rapacious birds; for the connecting links between the families see Owl and Owl Parrot.—The only well ascertained species within the United States is the Carolina parrot (*conurus Carolinensis*, Kuhl); in this the length is about 14 in., and the alar extent 22; the bill is short, bulging, and very strong; the head is large, the neck robust, and the body and tail elongated, the latter wedge-shaped; the bill is white and the iris hazel; general color green with bluish reflections, lightest below; fore part of head and cheeks bright red, extending over and behind the eye, the rest of the head and neck gamboge yellow; edge of wing yellow tinged with red; wings and their coverts varied with bluish green, greenish yellow, and brownish red; two middle tail feathers deep green, the others with the inner webs brownish red; thighs yellow. This species has been seen as far north as Lake Ontario, though now it is chiefly confined to the southern and southwestern states, and as far as the Missouri to the west. They are very fond of the seeds of the cockle burr, and eat almost any kind of fruit and grain, from their immense flocks committing great havoc in the garden, field, and orchard, destroying in search of seeds far more than they consume; they are killed in large numbers by the farmers, who consider their flesh a delicacy. The flight is rapid and direct, with great inclinations of the body and incessant noisy cries; they generally alight close together on the trees bearing the desired fruit; they are savage when wounded, but are easily tamed by immersion in water; they are destructive in captivity, and incapable of articulating words. They are fond of sand and saline earths. Many deposit their eggs in the same hollow of a tree, each laying two or three. Several other parrots are found in Mexico and Central America.—To the subfamily of *psittacinæ* belong the parrots best known in the domesticated condition, especially the gray and green parrots so common as pets; in this group the head is without crest, the margins of the bill are dentated or festooned, the wings pointed, and the tail short and square. In the old genus *psittacus* (Linn.) the bill is large, rather compressed, with biangular culmen much arched to the tip, near which the lateral margin is deeply notched, the under mandible much sinuated and the anterior edge sharp; wings generally reaching to the end of the tail, with second and third quills equal and longest. More than 40 species are found in the humid forests of Africa and South America; collecting at night in immense flocks, they leave their roosting places early in search of food, which consists chiefly of pulpy fruits and seeds, after which they bathe and retire to thick-leaved trees during the heat of the day, going in search of food again at night; they migrate in large flocks to warmer regions on the approach of the rainy season, rising to a great height and uttering the most discordant screams; the young are fed with the disgorged half masticated food of the parents. The gray parrot (*P. erythacus*, Linn.) is the most remarkable for its docility and power of articulation; it is about 12 in. long, of an ash-gray color, with a bright scarlet tail, yellowish white irides, and grayish feet and toes. It is a native of W. Africa, whence it has been imported from a very early period; in captivity it feeds on bread and milk, nuts, and even meat, holding its food with one foot, and reducing it to small pieces by the bill and cutters on the palate; it may reach the age of 70 and even 90 years. It breeds readily in captivity.—In the genus *chrysotis* (Swains.), of tropical South America, the bill is smaller but strongly dentated; the wings reach to the middle of the tail, which is broad and rounded. The green parrot (*C. Amazonicus*, Gmel.) is very often taken to the United States and Europe on account of its great colloquial powers; it is 12 in. long, the bill orange yellow, as well as the cheeks and chin; the general color is shining green, with a bluish purple band over the forehead, and the feathers of the hind neck edged with black; it inhabits the country watered by the Amazon, where it often does great mischief to the plantations. The festive parrot (*C. festivus*, Swains.), a native of the same forests, is 15 to 16 in. long, of a general green color, with a narrow red frontal band and eye streak, blue above and behind the eyes, lower back and rump vermilion, and the greater quills with blue outer webs and the inner greenish black; it is docile, easily tamed, and learns readily to pronounce words and sentences. The last two species are those most commonly brought from South America; several others are described. In the genus *psittacula* (Briss.) the size is generally small; the bill is rather large with the lateral margins festooned; the pointed wings extend to the end of the tail,

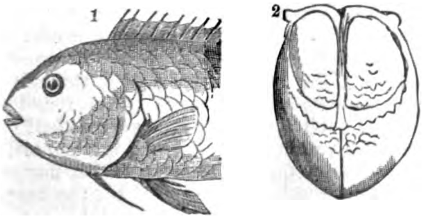
Carolina Parrot (Conurus Carolinensis).

Gray Parrot (Psittacus erythacus).

which is short and even; about 30 species are described in South America, Africa, and Asia and its archipelago; they are rapid fliers and expert climbers, often hanging head downward in their search for fruits; while feeding they utter a shrill chirp, like that of a large grasshopper; when sleeping they generally suspend themselves by one or both feet, head downward. Here belong the beautiful little "love birds," the genus *agapornis* of Selby. Swindern's love bird (*P. Swinderniana*, Kuhl) is a native of S. Africa; it is about 6 in. long, with a black strong bill whose upper mandible is notched; the head and nape are bright green, bounded by a black nuchal collar; neck and breast yellowish green, mantle and wings green, lower back and upper tail coverts azure blue; the short and nearly even tail has a median bar of vermilion edged with black and the tip green. These parrots are remarkable for their attachment to each other.

PARROT, Johann Jakob Friedrich Wilhelm, a German physician, born in Carlsruhe, Oct. 14, 1792, died in Dorpat, Jan. 15, 1841. In 1811 and 1812 he travelled in company with Engelhardt over southern Russia and the Caucasus, and on his return published *Reise in die Krim und Kaukasien* (2 vols., Berlin, 1815–'18). In 1821 he was appointed professor of physiology, pathology, and semeiology in the university of Dorpat, travelled in 1824 in the Pyrenees, and in 1829 was the first to make a successful ascent of Mt. Ararat. He wrote *Reise zum Ararat* (2 vols., Berlin, 1834; translated by Cooley, London, 1845); a treatise on "Gasometry" (Dorpat, 1814); and *Ansichten über die allgemeine Krankheitslehre* (Riga, 1821).

PARROT FISH, the common name of the numerous cyclolabroid fishes of the genus *scarus* (Forsk.); the name is derived from the beak-like form of their jaws; they also present the same brilliancy and variety of colors as do the parrots among birds. The form is oblong and stout, with the lateral line branching and interrupted under the end of the dorsal fin. The jaws are prominent, convex, each divided by a median suture; the teeth are incorporated with the bone, arranged in an imbricated manner in crowded quincunxes, the oldest forming the cutting border, and succeeded by the lower ranks as the former are worn away; their surface is generally smooth and polished; the pharyngeal teeth consist of trenchant transverse vertical plates, two above and one below, presenting when worn narrow ellipses of dentine surrounded by enamel; the lips are simple and fleshy, in some species leaving the teeth exposed. The body is covered with large scales, as far as the gill covers and cheeks, there being from 21 to 25 in a longitudinal line and 8 in a vertical one at the region of the pectorals; those at the base of the caudal fin are large and embrace a considerable portion of its rays; there is a single conical dorsal, with 9 spiny and 10 articulated rays; the anal has 2 spiny and 8 articulated rays. The muzzle is obtuse, and the profile sometimes rather high; there are no stomachal nor pancreatic cæca. About 100 species are described, living principally on the coral reefs of the West and East Indian archipelagoes, about one quarter dwelling around the Molucca and Sunda islands. The best known is the parrot fish of the Mediterranean (*S. Cretensis*, Rond.), red or blue according to season, highly esteemed by the ancients; it is about 15 in. long, of a general purplish color, roseous below, and violet brown on the back; the pectorals orange, ventrals with transverse lines of violet, and dorsal violet gray with golden spots and bands. There is more said of this fish in the ancient writers than of any other; in Pliny's time it was ranked as the first of fishes, and large sums were expended to stock the Italian waters with it from the sea between Crete and Asia Minor. By the ancients it was believed to have a voice, to sleep at night (alone of fishes), to release its companions and other fishes from nets, and to have the power of ruminating; the last belief naturally arose from the backward and forward movement of the jaws rendered possible by the mode of articulation, and necessary for the complete mastication of the seaweeds upon which it principally feeds. Its flesh is tender and easy of digestion, and the intestines and their contents were highly relished; the modern Greeks call it *scaro*, and consider it a fish of exquisite flavor, eating it with a sauce made of its liver and intestines, as the moderns eat plover and woodcock; its liver entered into the composition of the famous dish called "the shield of Minerva," with the brains of the peacock and pheasant, flamingoes' tongues, and the milt of the muræna eel. The red parrot fish of the West Indies (*S. Abilgaardii*, Val.), about 16 in. long, is a handsome species. The great parrot fish (*S. guacamaia*, Val.), from the same locality, attains a length of 2½ or 3 ft., and a weight of 30 lbs.; the colors are red, blue, and green. Many other beautiful species are described from North America in Dr. Storer's "Synopsis," and the whole genus is treated at length in vol. xiv. of the *Histoire naturelle des poissons* by Cuvier and Valenciennes.



1. Head of Parrot Fish. 2. Jaws, natural size.

PARROTT, Robert Parker, an American inventor, born in Lee, N. H., Oct. 5, 1804. He graduated at the United States military academy in 1824, became second lieutenant of artillery, and served at the academy from 1824 to 1829 as assistant professor of mathematics, and as principal assistant professor of natural and experimental philosophy. He afterward served with his regiment at Fort Constitution and Fort Independence. He was detailed for ordnance duty in 1834, took part as a staff officer in the war against the Creeks, and was appointed captain in the ordnance corps in 1836, from which he resigned shortly afterward to become superintendent of the West Point iron and cannon foundery, situated at Cold Spring, Putnam county, N. Y. He served as first judge of the court of common pleas for that county from 1844 to 1847. While in charge of the West Point foundery he invented and perfected the Parrott system of rifled guns and projectiles, which were first introduced into actual use at the battle of Bull Run, July 21, 1861; they were extensively used by the national army and navy till the end of the civil war. (See ARTILLERY, vol. i., p. 796.) One 30-pdr. gun of this system, mounted at Cumming's point, was used against Charleston, and withstood the extraordinary test of being fired 4,606 times before bursting.

PARRY, Sir William Edward, an English navigator, born in Bath, Dec. 19, 1790, died in Ems, Germany, July 8, 1855. He entered the navy in 1803, and became a midshipman in 1806, serving in the Baltic fleet. In 1810 he was commissioned lieutenant, and sailed to the polar seas about the North cape, where he corrected the admiralty charts of those waters. On the breaking out of the war between Great Britain and the United States he was sent to the North American station, where he remained till 1817, when he joined the arctic expedition of Capt. John Ross as commander of the Alexander, consort of the Isabella, Ross's ship. They left England in April, 1818, and proceeded to Lancaster sound, which they navigated for about 60 m., when Ross, imagining that he saw the way closed before them by a range of mountains, gave orders to return. Parry freely expressed his conviction that the range of mountains was an optical illusion; and as the public generally coincided in this opinion, it was determined in the spring of 1819 to equip a new expedition under his command. With the Hecla, 375 tons, and the Griper gun brig, 180 tons, under Lieut. Liddon, he reached Lancaster sound July 30, and sailed through it. He explored and named Barrow strait, Prince Regent inlet, and Wellington channel, and, entering the water which has since been called Parry or Melville sound, reached on Sept. 4 lon. 110° W., thereby earning a reward of £5,000 offered by parliament to the first ship's company which should attain that meridian. He wintered at Melville island, and his expedients to preserve the health and spirits of his crews during the long arctic night were scarcely less deserving of mention than his achievements as a discoverer. Exercise was rigorously enforced, all possible precautions were taken against scurvy, and a newspaper and theatre were provided as amusements. On Aug. 2, 1820, after being frozen in for 10 months, the ships were released; but the ice precluded the hope of further progress westward, and Parry returned to England. He was promoted to the rank of commander and elected a member of the royal society, and the narrative of his adventures was published by order of the admiralty. In May, 1821, Parry sailed again with the Fury, accompanied by Capt. Lyon in the Hecla. They were twice frozen in for several months, but made many explorations and discoveries by sea and land. (See ARCTIC DISCOVERY.) Returning, he arrived at Brassa sound, Shetland, Oct. 10, 1823. During his absence he had been made post captain (Nov. 8, 1821); and in December, 1823, he was appointed acting hydrographer to the admiralty. His "Journal of a Second Voyage for the Discovery of a Northwest Passage" was published by the admiralty in 1824. The results of these voyages encouraged further search, and the Hecla and Fury were consequently refitted as speedily as possible. In May, 1824, Capt. Parry sailed again in the Hecla, with Capt. Hoppner in the Fury under his orders. His plan was to pass through Prince Regent inlet, but winter overtook him almost at the entrance of that channel; and soon after the ice broke up, July 20, 1825, his vessels were caught in the drift and carried down the inlet. On Aug. 21 the Fury was driven ashore, and so badly damaged that she had to be abandoned. Her crew and stores were transferred to the Hecla, and Capt. Parry returned to England, having accomplished little or nothing. His "Journal of a Third Voyage for the Discovery of the Northwest Passage" appeared in 1826. He now turned his attention to a plan originally proposed by Scoresby for reaching the pole in boats that could be fitted to sledges, and set sail in the Hecla, March 27, 1827, for Spitzbergen. Here the vessel was left in harbor with a part of the crew, while the remainder, led by Capt. Parry and Lieut. James C. Ross, set out for the pole in two boats, June 20. These boats were framed of ash and hickory, covered with water-proof canvas, over which were successive planks of fir and oak, with a sheet of stout felt interposed. They were flat-bottomed inside, and had runners so that they could be used as sledges. The adventurers sailed through an open sea for about 80 m., and then found, instead of a solid plain of ice, a surface half covered with water, on which walking and sailing were almost equally difficult. With immense labor they reached lat. 82° 45′ N., the nearest point to the pole as yet attained by any expedition. At the end of September they arrived in England, where Capt. Parry published his "Narrative of an Attempt to reach the North Pole in Boats fitted for the Purpose" (1827), and resumed his duties as hydrographer to the admiralty. On April 29, 1829, he was knighted at the same time with Sir John Franklin. Both also received from the university of Oxford the degree of D. C. L. Parry was appointed commissioner of the Australian agricultural company, and passed five years at Port Stephens, about 90 m. from Sydney. Returning to England in 1834, he was appointed assistant poor-law commissioner for the county of Norfolk; was employed by the admiralty in 1837 to organize the packet service between Liverpool, Holyhead, and Dublin; and in April of the same year received the newly created office of comptroller of steam machinery for the royal navy. He retired from active service in December, 1846, with the appointment of captain-superintendent of the royal Clarence yard and of the naval hospital at Haslar near Portsmouth. In 1852 he was obliged to vacate this office on attaining the rank of rear admiral of the white, and in 1853 he was made lieutenant governor of Greenwich hospital. He wrote a treatise on "Nautical Astronomy by Night," "The Parental Character of God," and a "Lecture on Seamen." His life has been written by his son, the Rev. E. Parry (London, 1857).

PARRY SOUND. See MELVILLE SOUND.

PARRY SOUND, a judicial district of Ontario, Canada, on the E. shore of Georgian bay; area, 3,420 sq. m.; pop. in 1871, 1,519. It is watered by the outlet of Lake Nipissing and several other streams. Capital, Parry Sound.

PARSEES (*i. e.*, inhabitants of Fars or Persia), the modern followers of Zoroaster, mostly dwelling in Yezd and neighboring towns in Persia, and in Bombay and a few other places in India. While in Persia their number has decreased to about 7,000, they are steadily increasing in India, where they are variously estimated at from 150,000 to 200,000. The Mohammedans apply to them in contempt the name of Guebres or Ghaurs, meaning "infidels." (See GUEBRES.) When the empire of the Sassanides was destroyed by the Saracens (about 650), the Zoroastrians were persecuted, and most of them embraced Islamism. Only a small number clung to the old faith, and were finally allowed to settle in one of the most barren parts of Persia. Some of the Zoroastrians fled or emigrated to Hindostan, where the rajah of Guzerat was their principal protector; but on the spread of Mohammedanism they became again subject to persecution. Since the occupation of the country by the British they have fared better, and form now quite an influential portion of the population. They keep up an intercourse with their brethren in Persia. Their worship in the course of time became corrupted by many Hindoo practices, and the reverence for fire and the sun, as emblems of the glory of Ormuzd, degenerated into idolatrous practices. The sacred fire which Zoroaster was said to have brought from heaven is kept burning in consecrated spots, and temples are built over subterranean fires. Priests tend the fires on the altars, chanting hymns and burning incense. After an ineffectual attempt by the Parsee *punchayet* or council to purify the worship, a society called the *Rahnumai Mazdiasna*, or "Religious Reform Association," was organized in 1852 for the regeneration of the social condition of the Parsees and the restoration of the creed of Zoroaster to its original purity. The meetings and publications of this society are said to have had a considerable effect. There is now a marked desire on the part of the Parsees to adapt themselves to the manners and customs of Europeans. The public and private schools of Bombay are largely attended by their children, and every effort is made to procure the translation of standard English works. Many follow commercial pursuits, and several of the wealthiest merchants of India belong to the sect.—For their religious tenets and history, see ZEND-AVESTA, and ZOROASTER.

PARSLEY, a common umbelliferous garden plant which has been in cultivation for centuries. The old English authors wrote the word percely, evidently from the Fr. *persil*, that being derived from the Lat. *petroselinum*, which is from the Gr. πέτρος, a rock, and σέλινον, some umbelliferous plant. In most works the botanical name of parsley is given as *petroselinum sativum*, but Bentham and Hooker, in revising this most difficult family for their *Genera Plantarum*, found that *petroselinum* was not sufficiently distinct to rank as a genus, and united it with *carum*, the caraway; their views are likely to be adopted, and parsley will hereafter be *carum petroselinum*. The family *umbelliferæ* is often called the parsley family, and its members for the most part have a strong family resemblance; the genera are founded upon minute differences in the fruit, puzzling to the botanist, and altogether too obscure for popular description. Parsley, like many others of the family, has hollow

Single or Wild Parsley (Carum petroselinum).

stems, much divided leaves with sheathing petioles, and small five-petalled flowers in compound umbels, followed by a fruit which splits into one-seeded halves; the coating of these half fruits contains an aromatic oil in long narrow receptacles or oil tubes, which are often placed between elevated ribs. Parsley is a biennial, sometimes lasting longer, with a thick white root, which with the leaves and all other parts has a peculiar aromatic odor and taste. The leaves are triangular in general outline, twice pinnate and in the garden varieties much subdivided and cut. The first year it forms a tuft of radical leaves; the next year the flower stem appears and grows about 3 ft. high with umbels of small yellowish or greenish flowers, followed by the fruits or seeds. Parsley is a native of the eastern Mediterranean region, and being much cultivated throughout Europe has established itself in various localities; in England it is quite naturalized on some of the rocky coasts. It is cultivated in most gardens for its aromatic leaves, which are used in seasoning soups and various dishes, and also for garnishing, the rich green color of the leaves and their elegantly divided and crisped foliage making it superior to all other plants for this use. The original form of the plant, with plain leaves, is seldom seen, several varieties with finely cut foliage, called curled and double parsley, being preferred on account of their greater beauty; in some of the recent kinds, called fimbriated or mossy, the leaves are remarkably subdivided. Hamburg parsley is a large-rooted variety, cultivated in the same manner as carrots; its roots are used to flavor soups and stews, or are cooked separately like parsnips. The seeds of parsley are very slow in germinating, often remaining a month or six weeks before the plants appear. When the plants are large enough they are thinned to 10 in. apart, or transplanted and set at the same distance; it is said that repeated transplantings tend to make the leaves more double. Parsley is sometimes used as an edging to beds in kitchen gardens with pleasing effect. Market gardeners supply it fresh all winter; in September the foliage is cut away from the roots, and before cold weather a short dense tuft of leaves is formed; the plants are dug before the ground freezes, and stored in trenches covered with straw. If kept in the open ground over winter, it should be protected by litter; in spring it soon throws up its flower stalks. The leaves are the favorite food of the parsley worm, a green caterpillar marked with black and yellow spots; when disturbed it throws out, just behind its head, a pair of soft orange-colored horns, which emit a powerful and most repulsive odor; this is the larva of a large, handsome black butterfly with yellow markings, *papilio asterias.* Parsley has long been used medicinally, and at one time remarkable powers were attributed to it; the root is now occasionally employed as a diuretic. Its odor has a remarkable power in neutralizing or masking other odors; it is often chewed after eating onions, and it is said to render even the odor of garlic imperceptible. In some parts of England the superstition prevails among the rural people that to transplant parsley will entail bad luck.—Fool's parsley, *æthusa cynapium*, is a highly poisonous plant of the same family, introduced from Europe and more or less naturalized in some of the older states; as it resembles the plain form of parsley, serious accidents and even death have resulted in England from mistaking it for parsley. In flower the two are easily distinguished, as in the fool's parsley each partial umbel has an involucel of three long, narrow, pendent leaves beneath it, which the true parsley has not; mistakes may be avoided by using only the curled parsley.

PARSNIP (*pastinaca sativa*), an umbelliferous plant, cultivated for its edible root. The name was written pastnip by the old herbalists, from *pastinaca*, the ancient Latin name. The parsnip is found wild in southern and central Europe and temperate Russian Asia and parts of Great Britain, and is introduced into this country; it is usually a biennial, sometimes in the wild state flowering the first year. It has a hard tap root with strong branches; an erect stem about 2 ft. high and branching; lower leaves pinnate, and more or less downy on the under side, the divisions sharply toothed and more or less lobed; the umbels of yellow flowers of eight to twelve rays, flat on top, without involucres; fruit about three lines long, oval; the conspicuous oil tubes run their whole length. In cultivation the root is much increased in size, almost without branches, and is soft and fleshy; the stem is much taller and the leaves longer and smoother than when wild. Prof. Buckman of the royal agricultural college, England, experimented on the improvement of the parsnip from the wild state. He found that the plants from seeds sown as soon as ripe, and those from the same lot of seeds kept until spring and then sown, showed marked differences; and he regards the keeping of the seeds out of the ground, from the time they are ripe until they can be sown in spring, as an important step in cultivation, as it places the seeds in a condition quite different from their wild state. The roots in two generations from the wild seed showed differences in form, including specimens with tendencies in their shape toward that of the established cultivated varieties. Selecting a

Parsnip (Pastinaca sativa).

root of promising appearance, he continued to breed from this, and by careful selection established a variety which in ten years was put in the seed market as the student parsnip, which still maintains a high reputation. Parsnips were held in much esteem by the Romans, who boiled and ate them with honey; the leaves were eaten to promote digestion, and it was believed that if a portion of the plant were carried about the person the wearer would never be stung by serpents.—In cultivation parsnips do best in a light rich soil, which is better if manured the previous autumn; the seeds are not to be depended upon if more than a year old; they are sown in drills 15 in. apart, as early as the soil can be worked, thinned to 6 in. apart, and kept free from weeds until the leaves are so large as to prevent working between the rows. As the root is perfectly hardy, it is harvested after more tender kinds have been cared for; the roots are stored in trenches covered with litter, or placed in barrels or bins with sand or sandy earth among them to prevent drying. It is customary to leave a portion of the crop in the ground over winter, as many think the freezing it is subjected to renders the root more sweet and tender; but such roots should be dug as soon as the frost is out, as growth starts early, and if they begin to grow their quality is impaired. The varieties are few. The common or Dutch parsnip has a root 20 to 30 in. long and 3 to 4 in. in diameter at the shoulder, occasionally with a few strong fangs or branches. The Guernsey has very long tapering roots; on the island of Guernsey, where they are an important crop, it is not unusual for them to be 4 ft. long. The hollow-crowned has a depressed ring around the insertion of the leaf stalks, for which reason it is also called the cup parsnip; it is about 18 in. long and 4 in. in diameter at the shoulder, ending somewhat abruptly in a small tap root; this is the variety most cultivated. The round or turnip-rooted is very broad in proportion to its length. The student has a superior flavor. The yield is from 500 to 800 bushels to the acre, according to the soil. The root contains water 85·05, albuminoids 7·30, sugar 2·88, other carbohydrates 6·77, besides a small amount of oil and inorganic matter. An infusion of the roots contains sufficient sugar to form when fermented with hops a kind of beer, and a marmalade and parsnip wine are made from them.

PARSONS, a city of Labette co., Kansas, at the junction of the Sedalia branch of the Missouri, Kansas, and Texas railroad with the main line extending from Junction City to Denison, Texas, 120 m. S. by E. of Topeka; pop. in 1875, 3,500. It is built on a high rolling prairie between and near the junction of the Big and Little Labette rivers. The chief manufactories are the shops of the railroad company, a large grist mill, a steam furniture factory, a plough factory, three wagon and carriage factories, a brewery, a cotton gin, and a chair factory. There are a national bank with a capital of $800,000, a savings bank with $100,000 capital, masonic and odd fellows' halls, two public school buildings costing $40,000, graded public schools with 500 pupils, three weekly newspapers, and five churches: Congregational, Episcopal, Methodist, Presbyterian, and Roman Catholic. Parsons was laid out and the first lot sold, March 8, 1871.

PARSONS. I. Theophilus, an American jurist, born in Byfield, Essex co., Mass., Feb. 24, 1750, died in Boston, Oct. 30, 1813. He graduated at Harvard college in 1769, and was admitted to the bar at Falmouth (now Portland), Me., in 1774. The almost total destruction of Falmouth by a British fleet in October, 1775, having interrupted his career in that place, he returned to Byfield, and for several years received the instruction and assistance of Judge Trowbridge, called by Chancellor Kent "the oracle of the common law in New England." In the library of this jurist, one of the best in America, he laid the foundation of a vast accumulation of legal learning. Settling in Newburyport, he entered upon a lucrative practice, which gradually embraced all the New England states. In 1778 he formed one of the so-called "Essex Junto," a body of citizens of Essex county who opposed the adoption of the state constitution recently framed by the Massachusetts legislature; and he was probably the author of the pamphlet known as "The Essex Result," which contributed largely to the rejection of the constitution. In 1779 he was a delegate to the convention which framed the state constitution finally adopted; and in 1788 of the convention to ratify the federal constitution, which he actively supported, being the author of the "Proposition" offered by John Hancock ratifying the instrument, and recommending certain amendments known as the "conciliatory resolutions." He occasionally served in the legislature after this, but took no prominent part in public affairs, although to the close of his life he remained a consistent federalist. In 1800 he removed to Boston, and in 1806 was appointed chief justice of the supreme judicial court, which post he held at the time of his death. A collection of his judicial opinions was published in New York under the title of "Commentaries on the Law of the United States." His decisions threw much light upon the laws of pleading, marine insurance, and real property, and he rendered a substantial service to the community by discountenancing delays and expediting the trial of causes. He was distinguished as a classical scholar, and as a mathematician of considerable ability. An elaborate memoir of him has been published by his son (Boston, 1859). **II. Theophilus**, an American jurist, son of the preceding, born in Newburyport, Mass., May 17, 1797. He graduated at Harvard college in 1815, studied law, and after a brief visit to Europe entered upon the practice of his profession, first in Taunton, and afterward in

Boston. For several years he was a constant contributor to the "North American Review," writing also for other periodicals, and founded and edited the "United States Literary Gazette." He was an early convert to the doctrines of the New Jerusalem church, and has written much in exposition and defence of them. Three volumes of "Essays" (1845 *et seq.*), "Deus Homo" (1867), and "The Infinite and the Finite" (1872), are his chief Swedenborgian works. In 1847 he was appointed Dane professor of law in the Harvard law school, and he has since resided at Cambridge, occupying his leisure in the preparation of legal treatises. He has published "The Law of Contracts" (2 vols., 1853; 5th ed., 3 vols., 1864); "Elements of Mercantile Law" (1856); "Laws of Business for Business Men" (1857); an elaborate and comprehensive treatise on maritime law, including the law of shipping, the law of marine insurance, and the law and practice of admiralty (2 vols., 1859); "Notes and Bills of Exchange" (2 vols., 1862); "Law of Partnership" (1867); "Marine Insurance and General Average" (2 vols., 1868); "Shipping and Admiralty" (2 vols., 1869); and "The Political, Personal, and Property Rights of a Citizen of the United States" (1875).

PARSONS, Thomas William, an American poet, born in Boston, Aug. 18, 1819. He was educated at the Boston Latin school, and in 1836 visited Italy, where he studied Italian literature and translated the first 10 cantos of Dante's *Inferno* (Boston, 1843). He took the degree of M. D. at Harvard university in 1853, and for some years practised as a dentist. In 1854 he published "Ghetto di Roma," a volume of poems. His translation of the *Inferno* was completed and published, with illustrations, in 1867 (4to, Boston). He resided for some years in England, but returned to Boston in 1872. His later volumes of original poems are "The Magnolia" (printed privately, 1867), "The Old House at Sudbury" (1870), and "The Shadow of the Obelisk" (London, 1872).

PARSONSTOWN, or **Birr,** a town of King's co., Ireland, 69 m. W. S. W. of Dublin; pop. in 1871, 4,939. It contains two national schools (one for girls and one for boys), a hospital, a reading room, and a mechanics' institute. Near it is Birr castle, the residence of the earl of Rosse, with his celebrated observatory.

PARTHENOGENESIS (Gr. παρθένος, virgin, and γένεσις, birth), a name given to the phenomenon in the organic world, believed by many to occur, though still questioned by others, of a production of successive generations of procreating individuals, originating from a single fertilized ovum, but without any renewal, through such series, of fertilization. Ordinarily careful observations seem at first to result in the rule that, certainly in the animal realm, and probably in the vegetable, offspring can only arise by means of a union of sexual elements, though this union may be either obvious or concealed. Yet there were those among the earlier writers who held to be possible what they called a *lucina sine concubitu*. M. Bonnet, about the middle of the 18th century, first gave a scientific standing to this opinion, by discovering that the *aphis* (plant louse) may produce a numerous offspring, and these be followed by several generations, without the intervention in any known or conceivable way of the masculine fertilizing principle. M. de Quatrefages proposed to name this result *agamogenesis*, or production without union. The name at the head of this article was applied to certain cases of this kind by Prof. Owen. Of Siebold's work on this subject a translation appeared in London in 1857. Strictly, the name parthenogenesis is hardly appropriate, since either the producers in these cases are not perfect ordinary females, or the production is not that of perfect ordinary offspring; or both these circumstances may be true. Siebold investigated this unisexual, or at least unusual generation in certain sac-bearing *lepidoptera*, in the silkworm moth, and in the honey bee. In the first, females only result; in the second, both sexes. Along with Dzierzon, he obtained in relation to the honey bee the most complete set of observations. The queen bee, impregnated once for all for her five or six years of life, deposits thereafter, at proper periods, the germs of successive swarms or colonies; and the microscope reveals the fact that the eggs destined to become workers (imperfect females) and queens (perfect females) are fertilized, as ordinarily, by contact or penetration of spermatozoöids, while those to become drones (males) undergo no such influence; so that the production of these last is agamogenetic. In further proof, if the queen have her wings crippled from the first, so that she takes no flight, she produces only males, thus ruining the hive; and a like result may follow the pinching or freezing of one side of her body, and also, because the spermatozoöids have become exhausted, in her old age. So, rarely, the workers may without fertilization produce eggs, but those of males only. But any of these males, though all directly agamic or fatherless, can become efficient in a return to the ordinary or bisexual mode of reproduction. In his more recent work (Leipsic, 1871), Siebold has continued his observations to the wasps (*polistes* and *vespa*) and several other insects, showing that the males in many are developed from unfertilized eggs. According to Von Grimm ("Academy," 1870) parthenogenesis occurs in the pupa state in the dipterous genus *chironomus*, as Wagner had previously announced in *miastor*; this kind of reproduction is called by Von Baer *pædogenesis*. In this insect the formation of two egg-like reproductive bodies begins in the larva, but the eggs are not extruded till the pupa state is reached; and he thinks these cases may be due to self-fecundation.—Bonnet's experiments with the aphis yield, as intimated above, more curious results. He carefully isolated a newly hatched aphis by conveying it upon a twig beneath a glass shade dipping into water. Of fourscore offspring produced alive by this insect, one was isolated in like manner, and with similar result; and this was repeated as long as the observations continued, or for nine successive broods. As the young aphides are ready for propagation in about two weeks, it follows that in the course of a summer a single parent may have a progeny of millions, and all without renewed intervention of the male element. Kyber found that when warmth and food were abundantly supplied, this agamic production would go on for two or three years; but these broods, winged or wingless, consist almost wholly of imperfect females, seldom any males. The true females, always wingless, produce only after sexual union, and then eggs, not living offspring. And ordinarily, as the cold of autumn increases and the supply of food fails, the agamic young give place to true males and females, the latter laying eggs which the next spring hatch out again viviparous or imperfect females. Thus there is a cycle of changes; a large but varying number of links of non-paternal, being interposed between any two of paternal generation. The imperfect females have, in place of ovaries, certain tubular organs, the germs lying in which develop into living insects. Thus the case is only apparently, not really, anomalous; the real individual of the aphides is the perfect male or female only, and union of these must occur for the perpetuation of the race; but under favoring conditions, by a sort of exuberance of vital activity, an intercurrent production by gemmation or budding sets in, terminating finally in a return to the normal individual. According to this view, the drone bees are another instance of production by budding; and still others are said to be found in the *daphnia* (water fleas), and in some species of butterfly.—In plants, the occurrence of parthenogenesis, the development of an embryo in the ovule, and the production of perfect seed without the agency of the pollen or male element, was maintained in the last century by Spallanzani, who cited hemp and spinach as plants, among others, in which this took place. Since then the subject has been discussed by botanists, including some of the most eminent of the present day, without very decisive results; as experiments by different observers upon plants of the same kind have led to decidedly opposite conclusions, the question of the occurrence of parthenogenesis cannot be regarded as settled. The great difficulty attending experiments on hermaphrodite or bisexual plants has led observers to use those with separate sexes, and monœcious, or more generally diœcious plants, have been selected. A euphorbiaceous shrub from Australia, *cœlebogyne* (now *alchornea*) *ilicifolia*, produced in Europe female flowers and perfected seed, while no male plant was known to be in the country; the plant was supposed to be perfectly diœcious, neither male flowers nor stamens being detected, and the production of fertile seeds in this case was regarded as proof that, in this plant at least, the presence of pollen was not necessary to their formation and development. In 1857 Baillon asserted that he had found a stamen in one of the female flowers of *cœlebogyne*, but this was denied by Decaisne, who asserted that Baillon had mistaken a glanduliferous bract for a stamen; in 1860 Karsten announced that he had discovered two hermaphrodite flowers upon the plant, in the Berlin botanic garden, between May and August, which was regarded as sufficient to account for the fruiting. It is said that figs developed in summer contain no male flowers, yet the pistils of these produce seed containing an embryo; but both kinds of flowers in the fig are exceedingly small, and being enclosed within the hollow receptacle, accurate observation is surrounded with difficulties. The experiments of Naudin and Decaisne (Paris) with hemp were conducted with female plants, some in the open air surrounded by a high fence, and others in pots placed in a room in the second story of the house; no male flowers could be discovered on these plants, yet all bore fruit, and the female plants from these seeds, similarly isolated, ripened seeds also. On the other hand, Regel of St. Petersburg, in experimenting upon spinach and mercurialis, which Naudin and Decaisne had cited as giving seeds upon the female plant when isolated, cut back his specimens of these in order to reduce the number of flower clusters, and found that in every instance the female plants thus treated produced more or less male flowers, very much reduced and stunted, but with stamens which produced pollen, though the flowers containing them were so insignificant that they might have been unnoticed had not great care been taken in the search. Another instance cited by Naudin and Decaisne is bryony, a diœcious plant of the gourd family; the pistillate plants of this, from which access of pollen was carefully shut out, produced fruit in the greatest abundance; in 100 of these fruits 12 had no seeds, 45 had one seed, 29 two seeds, 11 three seeds, two had four, and one had five seeds. These illustrations are sufficient to show the difficulties in determining whether perfect seeds are formed without the influence of pollen upon the ovule. Besides the fact that male flowers may sometimes be developed upon female plants, and thus clandestinely supply pollen, there is another which must be taken into account: in flowers of separated sexes rudiments of the organs of the other sex are often distinctly seen; in the staminate flower, a knob or protuberance stands in the place of the pistil, and in pistillate flowers we have the places of the stamens occupied by glands, or abortive filaments, as if one or the other series of organs had been suppressed to make the flower male or female. The many well known instances in which a plant produces all three kinds of flowers, staminate, pistillate, and perfect, show that these suppressed organs may be developed into activity; and this happening in a single flower, or with a single stamen, might, unobserved, produce sufficient pollen to fertilize every ovary on the plant. Though the evidence cited to prove that parthenogenesis exists in plants may be of doubtful value, there is no good reason why it may not occur; indeed, analogy with animals, and the methods by which some plants reproduce themselves, indicate that its occurrence is not improbable. In many plants, especially some in high latitudes, small bulbs are produced in place of seeds, and in some abnormal flowers buds have been found occupying the place of the ovules, or prospective seeds; a small bulb, or bulblet, consists of several rudimentary leaves crowded upon a very short stem, and a bud has almost the same structure; the embryo within the seed is more simple than the bulblet and the bud, as it consists of a minute stem and only two leaves, or sometimes only one; that this embryo always requires the presence of pollen for its formation, while the more highly developed bulblet or bud is produced without it, is assuming more than some of our most eminent physiologists will admit. Until within a comparatively short time ferns and other cryptogamous plants were considered perfectly asexual, but it is now known that some if not all have organs corresponding in function to stamens and pistils; in ferns, for example, the spore produces a cellular plate, a sort of intermediate plant called prothallus, upon the surfaces of which are produced organs called archegonia, which when fertilized by the contact of antherozoids, produced by other organs upon the prothallus called antheridia, give birth to a new fern, and the prothallus, having served its purpose, disappears; here then is a regular sexual contact, and it has been supposed to be essential to the production of a new plant among ferns. Not long ago Prof. W. G. Farlow, now of Harvard university, discovered minute fern plantlets issuing from a prothallus upon which no antheridia or archegonia were present; and continuing his observations, he found in the same collection of seedlings about 50 which had been developed from prothalli destitute of both sexual organs, and showing very conclusively that in one fern at least asexual production of plants may take place.

PARTHENON. See ATHENS.

PARTHENOPE, in mythology, a siren, after whom the city of Neapolis in Campania (Naples) was believed to have originally borne the same name. The short-lived republic into which the French in 1799 transformed the Neapolitan kingdom was hence named the Parthenopean.

PARTHIA, an ancient country of Asia, which for several hundred years was the seat of an extensive and powerful empire. Parthia proper was a territory S. E. of the Caspian sea, now embraced in the northern portion of the Persian province of Khorasan, with an area of about 33,000 sq. m. It was bounded N. W. by Hyrcania, N. by the territory of the Chorasmii (Kharesm or Khiva), N. E. by Margiana, E. by Aria, S. E. by Drangiana or Sarangia, and S. and W. by the territory of the Sagartii. The soil of the valleys is fertile, producing large crops of wheat, barley, rice, and cotton; the climate is severe in winter and hot in summer. The mountains are extensive, but of no great height, none of them exceeding 6,000 ft.; and besides many smaller streams there are three rivers of considerable size, including the upper course of the Tedjend. Parthia had no large cities. The chief was Hecatompylos, one of the cities founded by Alexander the Great, which when the Parthian kingdom had expanded into an empire was abandoned by the sovereigns, though it always retained to some extent the distinction of being the national capital, and a royal palace was maintained there for the occasional reception of the court. The site of Hecatompylos has not been ascertained, but it is supposed to have been near lat. 37° and lon. 56° 30′.—The early history of the Parthians is very obscure. They are not mentioned at all in the Old Testament, nor in the Zend-Avesta, nor in the Assyrian inscriptions. In the inscriptions of Darius Hystaspis (521–486 B. C.) Parthia is enumerated among the provinces of the Persian empire. The inhabitants were a brave and hardy people, of Scythian origin, speaking a language half Scythian, half Aryan, were armed in the Scythian fashion, and displayed extraordinary skill in horsemanship and in archery. Their armies consisted chiefly of cavalry, and their favorite weapon was the bow, with which they fought while in motion, using it as formidably in retreating as in advancing. Herodotus speaks of them as a people subject to the Persians in the reign of Darius, and as taking part in the expedition of Xerxes against Greece (480 B. C.), armed with bows and with spears. They fought on the Persian side at Arbela against Alexander, and submitted to that conqueror without resistance after the death of Darius III. On the division of Alexander's empire among his chief generals, Parthia came for a time under the rule of Antigonus, and subsequently under that of Seleucus, king of Syria, whose dominion extended from the Mediterranean to the Indus. His successors Antiochus I. and II. were almost constantly engaged in wars with their neighbors in Asia Minor and in Egypt, and paid little attention to the remote eastern provinces, which they governed by satraps in the Persian manner. About 255 B. C. the satrap of Bactria, a Greek named Diodotus, revolted and proclaimed himself king. Antiochus II. made no effort to subdue him, and the independence of the new kingdom was established without bloodshed. A few years later (in 248, according to an inscription discovered by George Smith in 1874) Parthia followed the example of Bactria, and became independent under a chief named Arsaces, of whom contradictory accounts are given by the ancient historians. According to one account, he was a Bactrian who would not submit to Diodotus, and going into Parthia induced the natives to revolt and make him their king. Another account says he was a Parthian of high rank, who, having been grossly insulted by the Greek satrap, killed him and headed a successful revolt. A third version says that Arsaces was a Scythian chief, who with a predatory band entered Parthia, drove out the Greeks, and made himself king with the consent of the natives, who hailed him as a deliverer. This version is accepted as most probable by George Rawlinson, the latest historian of Parthia. Whatever his origin or however he acquired his power, Arsaces met with no opposition from Antiochus, and would have quickly established his rule but for malcontents, probably of Greek descent, in his new kingdom. He struggled with them for two years, and fell in battle in 247 or 246. He was succeeded by his brother, who in addition to his own name, Tiridates, took that of Arsaces, as did all the Parthian kings down to the fall of the empire under Arsaces XXXIV. (or XXX.). Arsaces II. reigned upward of 30 years, consolidated the monarchy, enlarged its boundaries by the conquest of Hyrcania, and made it a united and powerful nation. He repelled a formidable army which the Syrian king Seleucus Callinicus led to Parthia in 237, the victory over which was long celebrated by the Parthians as the second beginning of their independence. Arsaces III., whose proper name was Artabanus, and whose reign began about 214, conquered Media, an aggression which led to immediate reprisals by the Syrian king Antiochus III., who with a vast army retook Media, advanced into Parthia, and occupied Hecatompylos without opposition. He then invaded Hyrcania and captured several towns. The record of what followed has perished with the lost books of Polybius. It is only known that after a struggle of several years Antiochus retired about 206, having made a treaty acknowledging the independence of Parthia. For a considerable period after this Parthian history is almost a blank. Phraates I. (Arsaces V.), an active and warlike king, conquered several provinces from the Syrian monarchy. After a reign of seven years he was succeeded by his brother Mithridates I. (Arsaces VI.), the most distinguished of the Parthian kings. During his long reign (174–136) the kingdom expanded by his conquests into a great empire, extending from the Euphrates to the Indus, and including, besides Parthia proper, Bactria, Aria, Margiana, Hyrcania, Media, Persia, and Babylonia. Mithridates met with little opposition from the Syrian kings whose eastern provinces he appropriated, because those monarchs were too much absorbed by civil war in Syria to attend to anything else. But at length Demetrius II. so far suppressed his domestic enemies as to deem it prudent to undertake a campaign against the Parthians, who had now passed the Euphrates and were threatening Syria itself. He was received as a deliverer by the Greeks who occupied the cities, and who hated the Parthian conquerors; and with their aid and that of disaffected Persians and Bactrians, he won many battles at first, but was finally defeated in a great battle in which his army was destroyed and himself taken prisoner. Soon after this victory Mithridates died, and was succeeded by his son Phraates II. (Arsaces VII.). Antiochus Sidetes, the brother of Demetrius, had become king of Syria on the captivity of the latter, and in 129 undertook to rescue the captive king and to chastise the Parthians. He accordingly crossed the Euphrates with a vast army, which at first met with some success, but was at last totally defeated and destroyed, Antiochus himself being killed. The Parthian king Phraates did not long survive his victory; he became involved in a war with the Scythian nomads on his northern frontier, and was defeated and slain by them in 127. His successor Artabanus II. (Arsaces VIII.) met with the same fate about three years later. Mithridates II., called the Great by ancient writers, repelled the Scythian hordes and added to the empire many provinces on its northern side. He also invaded Armenia, which brought him into contact with the Romans. He probably died about 89, after a reign of 35 years. A period of civil war seems to have followed, during which negotiations with the Romans were carried on with regard to Armenia, and a sort of alliance was formed between the Roman general Pompey and a Parthian king named Phraates III., who was assassinated by his sons Mithridates and Orodes about 60. Mithridates became king, but was deposed and put to death by Orodes about 55. In that year Crassus became consul at Rome, and being appointed to the command of the East announced his intention of conquering Parthia. After a reconnoissance in force beyond the Euphrates in 54, he entered on his great campaign in 53 with a powerful army, which was totally defeated by the *surena* or general of Orodes near Carrhæ in Mesopotamia. Crassus escaped from the battle, but was soon after entrapped into a conference and put to death. Of his army three fourths were killed or captured. The victorious Parthians now invaded Syria, which had become a Roman province; but as their force was chiefly cavalry, they could not capture any of the cities, and were easily expelled from the country by Cassius the proconsul. Subsequently Orodes took part in the civil war that followed the death of Cæsar, by sending a body of cavalry to the aid of Brutus and Cassius; and in 40, having the aid of a Roman soldier of much experience, Labienus, one of the defeated party, he sent a great force to invade Syria under the joint command of Labienus and his own son Pacorus. The Parthians under Pacorus overran Syria, Phœnicia, and Palestine, in the last named country setting up Antigonus, an Asmonean prince, as priest-king, who governed Jerusalem for three years (40–37) as a Parthian satrap. Meanwhile Labienus with a portion of the Parthian army invaded Asia Minor, defeated and slew the Roman general who opposed him, and conquered Cilicia, Pamphylia, Lycia, and Caria, and it is said pillaged even Lydia and Ionia. For about a year the Parthians were undisputed masters of Asia, and Roman authority had disappeared. But in 39 Antony sent his lieutenant Ventidius with an army to the East. He landed on the coast of Asia Minor, and presently defeated and dispersed the invaders, capturing Labienus and putting him to death. He then turned his arms against Pacorus, defeated a Parthian force at the Syrian Gates, reconquered Syria, and drove Pacorus across the Euphrates in 39 or 38. The next year Pacorus recrossed the Euphrates with a powerful army, but was met by Ventidius and defeated and slain. His father Orodes, overwhelmed with grief, resigned the throne to his second son Phraates IV., who soon put him to death, killed his 30 brothers, and persecuted the Parthian nobles so severely that most of them fled into the neighboring countries. A body of them took refuge in Syria, where Antony was now in command, and persuaded him to invade Parthia. He began his invasion in 37 with a force of more than 100,000 men, whom he led through Armenia into Media. His expedition failed, and he was compelled to retreat with the loss of a third of his army. In 20 the emperor Augustus visited the East, and persuaded Phraates to restore to him the standards taken from Crassus, which were received in Rome with extravagant delight. After the death of Phraates, who was poisoned by his wife and son about the beginning of the Christian era, the history of Parthia for more than a century seems to have been chiefly a succession of revolutions and civil wars, ending in a disintegration of the empire, so that three or four monarchs, each claiming to be the true Arsaces, were ruling at the same time in different portions of the Parthian dominions. The Romans knew little of these divisions, their dealings being only with the Arsaces who reigned at Ctesiphon over Mesopotamia and Adiabene. About A. D. 108 the Arsaces at Ctesiphon bore the name Chosroes, and his nephew a few years before had been made king of Armenia by the Parthians without consulting the Romans, who had long claimed the right to nominate the occupant of the Armenian throne. Trajan, who was then emperor, having the Dacian war on his hands, had borne this insult without seeking redress until the subjugation of Dacia left him free to act. He then resolved on the conquest of Parthia, and in 114, after long preparation, began his expedition. Envoys of Chosroes met him at Athens with conciliatory proposals, which he rejected. He continued his march to Armenia, which submitted with little resistance and was declared a Roman province. The conquest of Mesopotamia speedily followed, together with that of some adjacent territories; but the natives were so turbulent and harassed the Romans so much that Trajan, who had occupied Ctesiphon, found it prudent to retreat into Syria at the end of 116.• In the following year he was taken ill, and leaving Hadrian in command in Syria he set out for Rome, but died on his way in Cilicia. Hadrian, who succeeded him as emperor, relinquished the conquests of Trajan and withdrew the Roman forces to the west side of the Euphrates. Peace between Rome and Parthia lasted till 161, when the Parthian king Vologeses III. on the death of Antoninus Pius suddenly invaded the Roman territories, conquered Armenia, and carried fire and sword through Syria into Palestine. Lucius Verus went to the East, and the Roman army, commanded by Avidius Cassius, defeated Vologeses in a great battle near the Euphrates and drove the Parthians across that river. Cassius then carried the war into Parthia. He captured and burnt the great city of Seleucia, plundered Ctesiphon, and recovered all the conquests of Trajan. The war with Rome terminated in 165, and peace between the two empires was maintained till the commotions which followed the murder of Commodus in 192 excited the Parthians of the provinces annexed by Cassius to rise in insurrection and massacre the Roman garrisons, and to besiege Nisibis, the Roman capital of Mesopotamia. The emperor Septimius Severus marched in 195 to the relief of Nisibis, reduced Mesopotamia to subjection, and added Adiabene to the empire. In the following year he returned to Rome to suppress the insurrection of Clodius Albinus, who had been proclaimed emperor. On his departure the Parthians renewed hostilities, recovered Adiabene, swept the Romans from Mesopotamia or shut them up in Nisibis, to which they laid siege, and even invaded Syria. Severus, having suppressed and slain his rival, returned to the East in 197, drove the Parthians across the Euphrates, which he himself passed with a powerful army, captured Babylon and Seleucia, and, after defeating the Parthian king in a great battle before the walls of Ctesiphon, took that capital by assault, gave it up to plunder, and before returning to Italy established a new Roman province in the region beyond the Tigris. His son Caracalla renewed the war, and after a campaign beyond the Tigris went into winter quarters at Edessa, but was assassinated in April, 217, by one of his officers. Macrinus, who succeeded to the command of the army and was proclaimed emperor, began to retreat toward Syria, but was attacked by Artabanus IV. (Arsaces XXXIV.), the last and one of the ablest of the Parthian kings. The Romans stood at bay at Nisibis, and the battle which ensued was the last and fiercest ever fought between the forces of the two great empires. It lasted three days, and resulted in the defeat of the Romans, who were compelled to purchase permission to retire unmolested at a price equivalent to about $7,000,000. Three or four years after this great battle Artaxerxes, the tributary king or satrap of Persia, who claimed descent from Cyrus and Darius Hystaspis, revolted against Artabanus, called the Persians and the followers of Zoroaster to arms, and, after a hard struggle which lasted five or six years, defeated and killed Artabanus in a great battle on the plain of Hormuz in 226. The Parthian empire thus perished after an existence of nearly five centuries, and the Persian empire of the Sassanians took its place. —See "The Sixth Great Oriental Monarchy," by George Rawlinson (London, 1873).

PARTITION, in law, the severance of common or undivided interests. It is particularly applied to interests in realty. At common law lands held by two or more persons were held by them either in joint tenancy, in common, or in coparcenery. The first two of these estates were created by the act of the parties. The last was created by operation of the law, when in casting a descent it devolved a single estate upon two or more heirs; as, for example, when an estate in fee of one who left no male succession passed to his daughters or other female representatives. These persons were called coparceners. Theirs was the only joint estate of which the common law would compel a dissolution at the request of a single party. Joint tenants and tenants in common became so, said the law, by their own mutual agreement and act, and the tenancy could be justly severed only by their mutual consent. But coparceners are rendered so by operation of law, and lest any one of them be prejudiced by the perverseness of his fellows, the law will lend its aid, if he ask it, and help him, by partition, to the enjoyment of his separate interest. In the reigns of Henry VIII. and of William IV. special statutes extended this common law benefit, which hitherto coparceners alone had enjoyed, to joint tenants and tenants in common; so that partition then became incident to all estates held in common. In the United States the technical joint tenancy is for the most part abolished; joint ownerships being, if not under express statutes, yet in effect, only tenancies in common. Therefore what in England would be estates in coparcenery are here estates in common, so that much of the English law of partition is inapplicable here. Yet as among us real property generally passes, on the death of an ancestor, to more persons than one, partition still retains an importance in respect to the tenancies in common of heirs and devisees. In some parts of the country, the operation of this remedy is extended by statutes beyond the limits fixed for it by the common law or the statutes of Henry VIII.—In England partition was made either by mutual consent or upon compulsion. In the latter case, the relief was sought either by a writ of partition, sued out by one party, at common law, or by his petition to the court of chancery. The latter is now the usual mode, and there is good reason for the preference of the chancery courts, as the procedure at law in a case of partition is far less effective than that in equity. The courts of law are limited to a mere allotment according to the proportional shares of the parties in interest; and this often causes a purely mechanical, and so prejudicial, division of an estate. But chancery, not restricted to the exact balancing of equivalent shares, but capable of all equitable adjustments of the matter, may distribute among the claimants the separate, though unequal, parcels of the estate, assigning to the several parties the portions which will best suit their respective condition, equalizing such a partition by decreeing pecuniary compensation to be made, or in other cases ordering equitable payments by some for improvements made in the common property by others. This jurisdiction is exercised with peculiar fitness in all cases where purely equitable rights, conflicting claims of parties, or modes of enjoyment are to be adjusted. Courts of equity will interpose only when the title of their petitioner is clear. If it be contested, he must try it at law. Wherever, in our states, distinct equity courts exist, they probably have concurrent jurisdiction with courts of law in respect to partitions, and, in general, such a jurisdiction as has just been described. But in almost all the states the cognizance of partitions is regulated by very minute statute provisions, and to these in each state reference must be made for the particular methods of procedure, and the powers of the courts. In some states the equity process is left undisturbed; in some the writ of partition, with certain modifications, still remains. Generally, however, the mode of obtaining partition is by petition to the higher courts of law. The courts of probate, too, are usually invested with the power to divide estates.

PARTNERSHIP, in law, exists when two or more persons combine their property, labor, or skill, or one or more of these, for the transaction of business for their common profit. It may be confined to a specific purpose or a single transaction; but when not so limited by the words of the partners, or by acts which imply limitation, it is general. All persons competent to do business on their own account may enter into partnership. Generally, the partners own the property and the profits jointly; but one or more of them may own exclusively the property or capital, leaving only the profits to be owned jointly. So all kinds of property may be owned by a partnership. But when real estate is so owned, the laws of record title, of transfer by deed, of inheritance, and of dower, have still an important operation. Generally the rule is this: Real estate is partnership property when it is bought with partnership funds, for partnership purposes, and is used for these purposes. Then it will be treated as part of the capital of the firm, and just as personal property is treated, so far as liability for the partnership debts is concerned, and until the remaining balance is ascertained and divided among the partners; but then its character as real estate is restored with all the incidents of dower and the like. The legal title must always be traced through the records. But if the property be, for example, in the name of one partner, he will be regarded as holding it in trust for the partnership; and if he die, his heir will be held as trustee, and only so much as is not wanted to pay the debts of the firm, or satisfy the claims of the other partners, will be permitted to remain in his hands, as his own and free from the obligations of the trust. So, the widow has her dower in the real estate after debts and claims are satisfied, and not before.—The good will of a partnership is, for many purposes, a part of its property, and may be transferred by sale or assigned for the benefit of creditors; and it would undoubtedly pass to the assignees under insolvency, by operation of law.—No partner, and no majority, can introduce a new partner without the consent of the others. A partner may sell out all his interest in a partnership, or may assign it as security for a debt; but the purchaser or assignee only acquires a right to have the balance due paid to him, and cannot acquire merely by the transfer a right to become a partner.—A partnership may be formed by an instrument under seal, which is perhaps the most common, or by a written instrument without seal, or by oral agreement, without any writing. In general, a partnership is formed by an agreement that the parties shall enter together into a certain business, and share the profits and losses. In the absence of special stipulations, the partners share equally, but may stipulate about this as they will. So the agreement may provide for its duration, but if the period appointed for its termination arrives, and it continues in fact, and without a new bargain, it will be held to continue upon the former terms.—Persons may be partners as to third persons who deal with the firm, while they are not partners as between themselves. Thus, A may agree with B and C that A shall render certain assistance to the firm of B and C, either of capital, credit, or skill, and not be held out as a partner, nor be a partner, and own a certain proportion of the profits, and not be liable for any share of the losses. Then, if the firm be not insolvent, A may claim of B and C his share of the profits, and, if obliged to pay any debt or loss of the firm, may claim compensation from B and C. But nevertheless, he will be just as liable to the creditors of the firm as B or C; and all his property will be as liable as their property. There have been many cases turning on this point, but the principle of law is clear and certain, however difficult it may sometimes be to apply it. This principle is, that whether a person is a partner in the firm in regard to the rights and obligations among the partners, depends upon the agreements they have made; but, whatever these agreements are, he is a partner as to third persons, that is, he incurs as to them all the responsibilities of a partner, in two ways, and on two grounds. One is, that he was, by his own consent, or by his own fault, held out to the world as a partner, so as to justify the creditors of the firm in dealing with it as if he were a partner; and the second is, that, without being so known or held out, he participates in fact in the profits of the concern. For it is a nearly universal rule, that one who participates in the profits as such is liable for the losses. The principal and most difficult question which has arisen on this subject, relates to clerks or salesmen who are paid by a share in the profits. Formerly it was held, that if such a person was paid, for example, "one twentieth part of the profits," this made him a partner, and liable as such; but if he was paid "a sum equal to one twentieth part of the profits," this was only a payment of wages, which was indeed measured by the profits, but did not make him a partner. But this technical and irrational distinction has passed away; and now the question in every such case would be: Does his bargain with the partners merely provide that his compensation shall be measured by the profits? for then he is only a person employed by the firm and not a partner; or does the bargain give him a property in the capital or in the profits? for this would make him liable as a partner. In other words, if the alleged partner has a right and property in one twentieth (or any other proportion) of the profits, while they remain undivided, he is a partner and liable as such; but if he has no such right or property, but only a claim against the firm for so such money as, upon a settlement of the firm's profits, one twentieth of them shall amount to, he is not a partner, and has none of the liabilities of that relation.—It is a general rule, both in England and in the United States, that no partner can sue another at law on any matter growing out of and connected with the transactions of the partnership business, and dependent for its determination upon the partnership accounts. The principal reason for this is, that whether one partner owes another or has a claim against him must depend upon a settlement of all the business and an adjustment of all the accounts. This a court of equity can direct and supervise by its machinery of masters, receivers, and the like, although a court of law cannot; and therefore it is now settled, as a general rule, that questions between partners about partnership affairs must go before a court of equity and not a court of law. But a partner may sue a partner at law in any matter not involving the partnership accounts; and so if a distinct part thereof is severed from the rest, and especially if a separate promise is made about this, a common action at law is maintainable for the balance. If, as is not unfrequently the case, a man is a member of two firms, one of those firms cannot sue the other at law, because the same person cannot be plaintiff and defendant. But if one of the firms holds the negotiable paper of the other, it may indorse it to a third person, who may sue the other firm.—Partners are of various kinds. They may be open or secret, active or dormant, retiring or new-coming. A secret partner is just as liable for the debts of the firm, when he is discovered, as an open and declared partner; so a dormant partner who only lends his capital or his name, and takes his profits, is just as liable as an active partner; for the one rule, which lies at the foundation of the whole law of partnership, is, that each partner, and the whole of his property, is liable for the whole of the partnership debts. This rule was until recently universal, and would be so now but for the special partnership recently introduced into this country from Europe. (See PARTNERSHIP, LIMITED.) A retiring partner who continues to receive a share of the profits continues to be liable for the debts of the firm, but is not made liable by receiving a certain definite sum, annually or otherwise, independently of the profits. He should give notice of his retirement; for those who deal with the firm in ignorance of his retirement, without their fault, may deal with it on his credit, and are authorized to hold him responsible. But a new customer, who had no dealings with the firm before the retirement of this partner, cannot hold the partner after retirement without notice, unless it can be shown that he came to the firm on the credit of this partner, and that he was justified in trusting to this credit. So if a creditor of a firm, knowing of such retirement, receives for his debt the negotiable paper of the firm, the presumption of law is that he intended to discharge the retiring partner; which presumption can be refuted only by evidence of an honest and actual intention to the contrary. A nominal partner, who lends his name to a firm without any interest whatever, is, in general, just as liable as if he were actually interested. If one purchases goods separately, and owes for them, those who become subsequently interested in the goods jointly with the first purchaser are not thereby made liable for the debt, unless the purchase was made originally by their joint authority, and for the purpose of bringing it into the partnership; for then the partnership existed at the beginning.—Throughout the commercial world, it is a universal rule, that each partner has full power and authority to act for the others and represent the whole firm in all matters appertaining to the partnership. There is perhaps no exception or limitation to this rule, other than by the principle that either partner's powers may be restrained by agreement, and all persons to whom this agreement is communicated are bound by it. Hence, on the continent of Europe, it is very common for the circulars or cards announcing a firm to specify which of the members is authorized to make purchases in one place or in another, or to draw or accept bills, and the like. Where there is not this agreed and declared limitation, each partner may make purchases, sales, loans, assignments, pledges, or mortgages of the partnership property, and give or receive notes or bills or money therefor; and any such transaction, done in reference to and within the scope of the partnership business, and with honest intent on the part of the person dealing with the firm, binds the firm and all the partners in regard to that person, however fraudulent the transaction may be in reference to the other partners. But if a partner, who has borrowed money in his own name, brings that money into the partnership, the partners are not thereby made liable for the debt; the firm owes the borrowing partner, and he alone owes the lender; and one who lends money to a partner, for the very purpose of enabling him to contribute the same to their capital, cannot hold the other partners without their assent.—Some partnerships are carried on in the name of an individual, who may also use his own name in his own business. In that case, paper bearing his name will be supposed to relate to his private and individual business, unless direct evidence or circumstances show it to have been on the firm's account. A release by or to one partner is a release by or to the firm, if there be no fraud; so a notice by or to one is notice by or to all.—The question sometimes arises, how far a new-coming member is responsible for a former and existing debt. The general answer is, that he is not so liable without his adoption of the debt; but this adoption may be shown by his express agreement, either with the firm or with the creditor, or it may be inferred from circumstances which distinctly indicate it; and it has been held that a payment by the firm, after he enters it, of the interest on an old debt with his knowledge and without objection by him, implies his adoption of the debt as due from his firm. But the liability of a new-coming partner for the existing debts of the firm cannot be presumed from the mere fact of his entering into the firm.—Whether a majority of the partners can bind a minority, and conduct the business of the firm at their pleasure, may not be quite settled; but the later authorities seem to confine this power of a majority to what may be called the domestic affairs of the firm, as the hiring a room or store, keeping clerks or books, and the like. At the same time it seems to be now well established that a partner who dissents from an inchoate and incomplete transaction, and distinctly expresses his dissent to the outside parties concerned in the transaction, giving them notice that he shall not be bound by the action of the firm, may in this way protect himself from liability. It should be added, however, that the recusant partner, after such denial and notice, may waive it, and will be considered as doing so if he permits the proceeds or avails of the transaction to be brought into the common account and the common fund for the common benefit. —The dissolution of a partnership, however caused, has no effect upon its existing debts, or upon the liability of the partners for them; but it entirely prevents the contracting of any new debt by the firm, because that has ceased to exist. Hence the former partners can in no way bind one another by any new contracts. Thus, no partner can indorse a note of the firm, either with the firm's name or his own, even if it be to pay a debt of the firm; and even authority given by the firm to one partner to settle the affairs of the firm would not, generally, carry with it the power to make such indorsement. Dissolution may take place in many ways. 1. By the expiration of the time when it is to terminate by the articles; but if it goes on as before, although nothing be said, the law will presume an agreement to continue it on the former terms. 2. It may certainly be dissolved at the pleasure of any partner, if there be no limited term in the articles; and if there be, and even if there be a mutual covenant not to dissolve, we should say that any partner might dissolve the copartnership at his pleasure, always being liable to respond in damages for any injury he may inflict by his breach of contract. But a court of equity would probably interfere to prevent a causeless or fraudulent dissolution, especially if it were obvious that injury would be done which could not be adequately compensated by damages. So a court of equity would always decree a dissolution at the prayer of any partner, if he could show good cause, of sufficient magnitude; and in any such case the court would appoint a receiver if that were necessary, and do or order all other things which the interests and equities of the parties required. 3. An assignment by a partner of his whole share and interest in the copartnership property and business would of itself work a dissolution; and it would be so even if one partner assigned his whole share to another partner, because this would be equivalent to this partner's going out of the firm. 4. Any departure from a firm or copartnership by any partner dissolves that firm, however it be caused. The firm may go on as before, taking in or not new partners, but it is in law a new firm, for the simple reason that a partnership is in no sense or measure a corporation. Hence, the death of any member of a firm dissolves that firm. Even if the articles provide for that casualty, and it is agreed that the firm shall go on with unchanged name, and that no account shall be taken, but the share of the deceased be paid to his representatives by cash or notes to a certain amount, still in law the old firm ceased when the partner died, and a new one began. 5. Bankruptcy of the firm, or perhaps of any partner, dissolves the firm at once. Whether the insanity of a partner has that effect may not be certain, but we should say that insanity which would probably be permanent would unquestionably be a good ground for dissolution by the court or by the parties, but that it would not of itself, and by its own force, effect a dissolution.—If a partnership is dissolved by the death of a partner, the whole property and business pass to the survivor or survivors, but only for the purpose of settling up the business and closing the concerns of the partnership as soon as this can be done in a proper way. The surviving partners and the representatives of the deceased may come to some agreement about this, or the articles may provide for such an event. But in the absence of any such agreement or provision, the survivors take everything, with the powers necessary for the speediest and best settlement, and no more; nor can they, even for the purpose of settlement, make new contracts binding the estate or representatives of the deceased. When the settlement is finally and fully made, the survivors must pay over to the representatives of the deceased the share due to the estate; but until then the representatives cannot interfere with the management of the property, although a court of equity will interfere, on their petition, to prevent waste, delay, or other injurious conduct by the survivors.—The rules of law in regard to the rights of creditors over the funds of the partnership, and the property of the partners, are very important, but in some particulars they are not quite settled. It is certain that the joint funds of the partnership are, in the first place, to be applied and appropriated to pay the joint debts, that is, to pay the partnership creditors; and the private creditors of the individual partners cannot touch the partnership funds in any way until these have paid in full all the partnership debts. It is also certain that the private creditors of an individual partner may reach by any proper process of law the private and separate property of the partner who is their debtor. So, too, it is certain that the creditors of the firm may, at some time, resort to the private property of the partners. The uncertainty is involved in this question: While the creditors of the firm have an exclusive right to the property of the firm, have the private creditors of the partners an equally exclusive right to the private property of the indebted partners? Upon this it can only be said that the rulings of courts are greatly at variance.—What right a creditor of a partner in a solvent firm has, and how he may effectuate his right, is a matter of much uncertainty. The prevailing principle may be stated in this way. The creditor can take only what his debtor has. This is not a several and distinct right to or property in any part of the partnership funds; for it is only an ownership of the whole in common with the other partners, and thence a right to have the accounts settled, and the debts of the firm paid, and then his share of the balance set off or paid to him in severalty. This right or interest his creditor may acquire by attachment or levy; and if it be done by attachment, a frequent, and generally speaking the better way, is to summon all the partners as trustees or garnishees under the process of foreign attachment.

PARTNERSHIP, Limited (or, as it is sometimes called, special partnership), a partnership whereof one or more of the members contribute a certain amount to the capital, which may be lost by its being demanded for payment of the debts of the firm, but beyond which they have no further liability. This is utterly unknown to the common law, or to the law merchant as existing in England and the United States; but it has been common on the continent of Europe for a long time. Recently it has been adopted in this country, and is now common. After much opposition, it has also to some extent become established in England. The statutes of no two states, perhaps, are precisely the same; but they agree substantially in the following provisions: 1, there must be one or more general partners, all of whom are liable *in solido;* 2, there may be one or more special partners, and the specific sum contributed by each special partner must be actually paid in; 3, the arrangement or articles of partnership must be in writing, must generally be acknowledged before a magistrate, and must be published in one or more newspapers; 4, this advertisement, or publication, must state accurately the names and residence of the general partners, the names and residence of the special partners, the name of the firm, the sum which each special partner contributes, the business to be transacted, and the period for which the partnership is made or the time when it will terminate; and during that time the special partner cannot withdraw his capital. In some of the states there are provisions limiting special partnerships to mercantile business, and excluding insurance, banking, &c. If any of the requirements of law are disregarded, the special partner becomes a general partner, and is liable *in solido.* The courts apply these rules with much severity. Thus, a special partner has been held liable *in solido* because, by an error of one of the newspapers, the sum he contributed was stated erroneously. (See JOINT-STOCK COMPANY, and LIMITED LIABILITY.)

PARTON. I. James, an American author, born in Canterbury, England, Feb. 9, 1822. At five years of age he was brought to New York, and at 19 he became a teacher in an academy at White Plains, Westchester co., and afterward in Philadelphia and New York. His first literary employment was on the staff of the "Home Journal" of New York, with which he was connected about three years. Since then he has devoted himself to literary labor and public lecturing. In March, 1875, he purchased a house in Newburyport, Mass., intending to make it his future residence. He has published a "Life of Horace Greeley" (New York, 1855; new ed., 1868); a collection of "Humorous Poetry of the English Language, from Chaucer to Saxe" (1857); "Life and Times of Aaron Burr" (1857; new ed., 2 vols., 1864); "General Butler in New Orleans" (1863); "Life and Times of Benjamin Franklin" (2 vols., 1864); "Smoking and Drinking," and "People's Book of Biography" (1868); "Famous Americans of Recent Times" (1870); "Triumphs of Enterprise, Ingenuity, and Public Spirit" (1871); "Topics of the Time" (1871); "Words of Washington" (1872); and "Life of Thomas Jefferson" (1874). In 1875 he was engaged upon a series of articles for "Harper's Monthly" on "Caricatures in all Times and Lands." For 15 years he has been collecting materials for a life of Voltaire. **II. Sara Payson Willis,** wife of the preceding, born in Portland, Me., July 7, 1811, died in New York, Oct. 10, 1872. Her father, Nathaniel Willis, was for many years editor of the "Boston Recorder." She was married to Charles H. Eldredge, cashier of the merchants' bank, Boston, with whom she lived for several years in affluence and happiness; but upon the death of her husband she was suddenly thrown upon her own resources to provide a maintenance for herself and two children. After unsuccessful attempts to procure employment as a teacher and in other vocations, she turned her attention in 1851 to literature, and prepared a short essay which was rejected by the editors of several Boston journals. One of them at length purchased it for half a dollar; it proved successful, and was rapidly followed by others, which soon made her pseudonyme of "Fanny Fern" famous. A collection of her sketches was published in 1853 under the title of "Fern Leaves," of which 70,000 copies were sold in a short time. This was followed by "Little Ferns" (1853), "Fern Leaves, Second Series" (1854), "Ruth Hall," "Rose Clark," "Fresh Leaves" (1857), "The Play Day Book" (1857), "Folly as it Flies" (1868), "Ginger Snaps" (1870), and "Caper Sauce" (1871). For the last few years of her life she was chiefly employed in writing for the "New York Ledger." She was married to Mr. Parton in January, 1856.—See "Fanny Fern, a Memorial Volume, containing her Select Writings and a Memoir," by James Parton (1873).

PARTRIDGE, the popular name of the family of *perdicidæ,* which includes also the quails. They differ from the grouse in having the legs bare and the nostrils protected by a naked hard scale; they are also smaller and the species are more numerous; the head seldom has a naked space around the eyes, and the sides of the toes are hardly pectinated; they are widely distributed over the globe, but the true partridges, or *perdicinæ,* have no representative in America. Great confusion exists in the application of the term partridge; the spruce partridge is the Canada grouse (*tetrao* [*canace*] *Canadensis,* Linn.); the partridge of New England is the ruffed grouse (*bonasa umbellus,* Steph.); the partridge of the middle and southern states is the quail (*ortyx Virginianus*, Bonap.); several other quails are called partridges, as the plumed and Gambel's of California, the scaled or blue and the Massena of the valley of the Rio Grande in Texas; on the other hand, the birds called quails in Europe belong to the partridges and to the genus *coturnix* (Möhr.); such of the so-called partridges, therefore, as are not described here will be found under GROUSE and QUAIL, and the francolin partridges under FRANCOLIN.—The typical partridges belong to the genus *perdix* (Briss.); the bill is short, broad at the base, with the apex curved and vaulted; the wings moderate and rounded, with the third, fourth, and fifth quills longest; tail short and greatly concealed by the coverts; tarsi without spurs or tubercles; toes long, inner shorter than outer, hind one short and slender, and claws moderate and slightly curved. There are about a dozen species in the temperate parts of the old world, some constant residents and others migratory, some frequenting cultivated lands and others forests; though occasionally perching on trees, they are generally seen on the ground, searching for grain, seeds, bulbous roots, and insects; the nest is a slight hollow on the ground, beneath some bush, and the eggs are from 12 to 20. The common or gray partridge (*P. cinerea*, Lath.) is about 12 in. long, with an alar extent of 20 in.; the body is round and stout, the head small, and the legs and tail short. Though the plumage has no brilliant colors, it is very neat, and its intricate upper markings of ash-gray, yellowish brown, brownish black, and brownish red are pleasing to the eye; the scapulars and wing coverts are darker with whitish streaks; the forehead, cheeks, and throat light red; neck ash-gray, with minute black undulations; sides with broad bands of brownish red, and a large patch of the same on the breast. The female is a little smaller, with the upper parts browner and the top of the head streaked with yellowish; both sexes present considerable variations. This species is spread abundantly over Europe, and is sometimes found in N. Africa, generally in the vicinity of grain fields and very rarely in woods; it runs with great speed, squatting close to the ground when alarmed; the flight is rapid, direct, low, and accompanied with a whirring sound; it is wary, and easily frightened; the affection for the young, or pouts, is very remarkable, and various devices are used by the parents to distract attention from the brood. During winter they keep together in coveys, searching for food among the stubble; they separate early in spring, pairing in March, the eggs being laid in June; the males take no part in incubation, but watch the nest. The genus is monogamous. This is one of the best game birds, as its flesh is tender and well flavored; shooting it forms a favorite and exciting amusement, especially in Great Britain; the bird is so prolific that, with protection during the breeding season, their numbers do not materially diminish, and the markets are so well supplied that the price brings them within the reach of the middle classes. The partridge thrives well in captivity, and its inclination to the neighborhood of man seems to indicate that with proper treatment and food it might be domesticated. It is not only the victim of man, but of carnivorous mammals and birds, to the last of which it is peculiarly exposed on account of its terrestrial habits and short flight.—The Guernsey or red-legged partridge belongs to the genus *caccabis* (Kaup); in this the bill is more arched and the tarsi are armed with a blunt tubercle. This species (*C. rufa*, Kaup) is 14 in. long, with an alar extent of 21 in.; the bill and feet are bright red; upper parts reddish brown tinged with gray; a black band from the bill to the eye, and thence down the neck, becoming wider and meeting in front that of the opposite side; lower parts ash-gray and light red, and sides banded with the same and black and white. It is confined chiefly to the southern countries of Europe and to Asia and

Common Partridge (Perdix cinerea).

Guernsey Partridge (Caccabis rufa).

Africa; it is found also in the islands of Guernsey and Jersey; its flesh is highly esteemed, but it affords less sport than the common species from the separation of the flock when pursued by dogs; it is also believed to drive off the gray partridge. The Greek or rock partridge (*C. Græca*, Briss.) is larger than the last, and has the plumage more ashy; it inhabits the mountainous regions of Greece, Turkey, and Asia Minor, and is probably the species alluded to in the Hebrew and other ancient writings; the flesh is white and much esteemed, though it is occasionally bitter.—The genus *ithaginis* (Wagl.) has a short stout bill, lengthened and rounded tail, long tarsi armed with two or three blunt spurs, and the toes and claws long. Here belongs the sanguine partridge (*I. cruentus*, Hardw.), from the mountains of N. India; it is slate-colored above with yellow streaks, and greenish yellow below irregularly spotted with red; edge of tail coverts and vent red; it is nearly as large as a pheasant.

PARTRIDGE, Alden, an American soldier, born in Norwich, Vt., about 1785, died there, Jan. 17, 1854. He graduated at West Point in 1806, and acted as assistant professor and afterward professor of mathematics in that institution from that time till 1813. He was professor of engineering from 1813 to 1816, and superintendent from January, 1815, to November, 1816, and from January to July, 1817. In 1818 he left the service, with the rank of captain. He was the principal of the exploring survey sent out in 1819 to determine the N. W. boundary of the United States. He founded in 1820 at Norwich, Vt., a military academy, which was afterward removed for a time to Middletown, Conn., but restored to Norwich and incorporated as Norwich university, with Capt. Partridge as its president. He subsequently founded similar institutions in New Hampshire, Pennsylvania, Virginia, and Delaware, was chosen surveyor general of his native state in 1822, and was a member of the Vermont legislature from 1833 to 1839.

PARTRIDGE BERRY, a name sometimes applied to the common plant *Gaultheria procumbens* (see WINTERGREEN), but which properly belongs and should be restricted to *Mitchella repens*. This genus was named by Linnæus in honor of Dr. John Mitchell, a resident of Virginia and an excellent botanist. It belongs to the madder family (*rubiaceæ*), and consists of a single Japanese species besides our own, which extends from Canada throughout the states to Mexico, and is also found in the mountains of South America. The partridge berry is a small trailing evergreen, with a much branching stem a foot or less long; it is common in dry woods, forming a dense mat about the foot of trees; the opposite short-petioled leaves are round-ovate, dark green, and often variegated with whitish lines; the flowers are in pairs, with their two inferior ovaries united, the tube of the funnel-shaped corolla about half an inch long, the limb with four spreading lobes densely bearded within, pearly white, often tinged with rose or purplish and very fragrant; the four stamens and single pistil are dimorphous, *i. e.*, in some flowers the stamens are long and protrude beyond the throat of the corolla, while in other flowers this is reversed, the pistil being long and the stamens hidden within the tube. The fruit is about the size of a whortleberry, broader than long, and being of two cohering ovaries shows the calyces of the two flowers; it is bright scarlet, and each half contains four bony nutlets in a white pulp. The berries remain on the plant through the winter, and it is not rare to find ripe fruit at the same time with the flowers in June. Other local names are one-berry, two-eyes, winter clover, and in some parts of New England checkerberry. The berries, while edible, are almost tasteless, and few care to eat them, but they furnish food for birds.

Partridge Berry (Mitchella repens).

PARTRIDGE WOOD, a wood imported from South America and some parts of the West Indies for the use of cabinet makers, by whom it is prized for fine work. It is reddish, beautifully marked with parallel lines and streaks of a darker color. Its toughness also makes it valuable for umbrella sticks and similar uses. Several trees, of different families, have been credited with furnishing this wood, and it is likely that the product of two or more different trees is known in commerce under the same name. According to Guibourt, the government museums in France have specimens under the name of *bois de perdrix* which belong to different trees, and the wood known in the Paris market by that name appears to be different from the partridge wood of the London dealers. These woods are apparently from trees of the family of *leguminosæ; andira inermis* seems to furnish one of them, but the matter is involved in much confusion.

PARTY WALL, in law, a dividing wall between lands of different proprietors, used in common for the support of structures on both sides. At the common law an owner who has occasion to build on the line of his premises has no right to go beyond the exact line of division between himself and his neighbor, unless he has the neighbor's assent so to do. Nor, though he should erect a wall for his own buildings which is capable of being used by the adjoining proprietor, can he compel such proprietor, when he shall build next to it, to pay any portion of the cost of such wall. But on the other hand, the adjoining proprietor has no right to make any use whatever of such wall without the consent of the owner, and the consequence may be the erection of two walls side by side where one would answer all purposes. This inconvenience is often obviated by an agreement under which a wall for common use is erected, one half of which is on the land of each proprietor, and the expense is borne and the use shared equally; or if only one is to build at the time, the wall may be constructed by him at his own expense, but on the understanding that the other shall pay half the cost when he builds. Under such an agreement each has an easement in the land of the other while the wall stands, and this accompanies the title in sales and descent. But if the wall is destroyed by decay or accident, the easement is gone unless by deed such a contingency is provided for. Repairs to party walls are to be borne equally, but if one has occasion to strengthen or improve them for more extensive buildings than were first contemplated, he cannot compel the other to divide with him this expense. In some states there are statutes regulating rights in party walls, and one may undoubtedly acquire rights by prescription in a wall built by another which he has long been allowed to use for the support of his own structures.

PASARGADÆ, or **Pasargada**, the capital of ancient Persia under Cyrus and Cambyses. Its name is translated by Stephen of Byzantium, "the encampment of all the Persians." Its site is not known. There are some who contend that Pasargadæ and Persepolis were the same place; others that it was situated to the southeast of Persepolis, at the modern Darabgerd or Fasa (which Spiegel prefers); and others again that it lay to the northeast of it, near the modern Murgab. (See PERSEPOLIS.) All of these views are more or less sustained by passages of ancient writers, but Murgab has the advantage of possessing many ruins and relics of the time of the ancient Persians. Among these is a tomb called by the natives the tomb of Solomon's mother, but which is supposed by Rawlinson and others to be that of Cyrus. On a square base, composed of immense blocks of white marble, that rise in steps, stands a quadrangular chamber, built of blocks of marble 5 ft. thick, shaped at the top into a sloping roof. The chamber seems to have held a sarcophagus. Upon pillars near by repeatedly occurs the inscription in Persian and Median: "I am Cyrus the Achæmenian." As the monument is of the style in which the Persians still build the tombs of women, Oppert is of opinion that it was probably erected by Cyrus, but was the tomb of a woman, perhaps of Cassandane, mentioned by Herodotus. Pasargadæ was esteemed by the people for its antiquity, and was under the especial protection of the magi. It contained the most ancient royal palace and the treasures. The Persian kings were inaugurated there. The city was the stronghold of a tribe of the same name, the noblest of the three principal tribes of the ancient Persians. The Achæmenidæ, to whom Cyrus, Darius, and other kings belonged, and who were in fact the royal family of ancient Persia, were a clan of the Pasargadæ. They were apparently the direct descendants of the original Persian tribe which emigrated from further east about 1500 B. C., and which as it rose to power imposed its name upon the people and the country.

PASCAGOULA, a river of Mississippi, formed by the junction of the Leaf and Chickasahay in Greene co. It flows southerly through Jackson co. into Mississippi sound, through two mouths, its embouchure forming Pascagoula bay. It is navigable for 100 m. or more by small vessels, which export lumber, turpentine, and other products of the pine forests through which it flows. The name is derived from that of the Pasca-ogoulas ("Bread-eaters") or Pascagoulas, a tribe of Indians formerly inhabiting the vicinity. On the E. mouth of the river is the village of Pascagoula, or East Pascagoula, which has 500 inhabitants and a large hotel, and is much frequented as a summer watering place. There are extensive saw mills in the vicinity.—The embouchure of Pascagoula river is celebrated for the "mysterious music" which may often be heard there on still summer evenings. The listener being on the beach, or, yet more favorably, in a boat floating upon the river, a low, plaintive sound is heard, rising and falling like that of an Æolian harp, and seeming to issue from the water. The sounds, which are described as sweet and plaintive, but monotonous, cease as soon as there is any noise or disturbance of the water. The most plausible conjecture in explanation of its origin is that it is occasioned by some species of shell fish or other marine animal.

PASCAL, Blaise, a French author, born in Clermont, Auvergne, June 19, 1623, died in Paris, Aug. 19, 1662. His father was president of the court of aids in his native city, but sold his office in 1631 and removed to Paris to devote himself to the education of his son and two daughters. He directed the studies of the son to languages and general literature, avoiding everything connected with the exact sciences. But without assistance, and ignorant of the very rudiments of mathematics, the boy secretly applied himself to drawing and reflecting upon geometrical figures, until he had gone through a series of definitions, axioms, and demonstrations as far as the 32d proposition of Euclid. On discovering this, his father gave him mathematical instruction. Blaise was soon admitted to the meetings of scientific societies, where he astounded the most learned; and at the age of 16 he composed a "Treatise on Conic Sections." In 1639 he accompanied his father to Rouen, where the latter had been appointed superintendent of finance for the province of Normandy; and there he invented a calculating machine, which was improved by L'Épine and Boitissendeau, but it never came into practical use. He published an account of it in 1645, and in 1650 offered it to Queen Christina of Sweden. During his stay in Rouen he also invented the *vinaigrette* (wheelbarrow chair), the *haquet* (a kind of dray), and, according to some, the hydraulic press. His health was seriously impaired by his labors, and his subsequent life was a succession of sufferings. In 1648 his brother-in-law M. Périer, in accordance with instructions given by Pascal in a letter of the previous year, executed on the Puy-de-Dôme, near Clermont, and at Rouen, and Pascal himself at the tower of St. Jacques-la-Boucherie in Paris, a series of barometrical experiments, which went far to confirm the discoveries of Galileo, Torricelli, and Descartes respecting the weight and elasticity of air. Pascal was led by these experiments to use the barometer for levelling, and for ascertaining the pressure of fluids upon the sides of the vessels containing them, and establishing the laws of their equilibrium. His *Expériences touchant le vide* were published in 1647, and were assailed by Father Noël, a Jesuit, who presented himself as the champion of the old system, and whom Pascal answered in two letters. About this period he had a stroke of paralysis by which he lost for a while the use of his legs; at the same time he studied intensely devotional works. In 1654 he withdrew from society, and entered upon a course of self-denial and austerity, which characterized the remaining years of his life. Amid his previous gayeties, however, in which he had engaged on the advice of his physician, he had written some of his philosophical works, such as his treatises *De la pesanteur de la masse de l'air*, and *De l'équilibre des liqueurs*, which was first published in 1663. In 1654 he completed an "arithmetical triangle," by which he illustrated mathematically certain laws connected with bets and games of chance; it was an approach toward the binominal theorem of Newton. After his death three treatises of his were published (1665) in which he had laid down the principles of the calculus of probabilities. The Port Royalists were now the upholders of the doctrines of Jansenius, and Pascal frequently visited their house, and soon interested himself in their quarrel with the Jesuits. When, at the end of 1655, Antoine Arnauld was expelled from the Sorbonne on account of his letter in defence of Jansenism, Pascal published the first of the series of *Lettres de Louis de Montalte à un provincial de ses amis et aux RR. PP. les Jésuites sur la morale et la politique de ces pères*, which became so celebrated under the abbreviated title of "The Provincial Letters." The first of these letters, which appeared Jan. 23, 1656, was eagerly read and circulated; it was followed at intervals by 17 others within a period of 14 months. The replies of the Jesuits, the condemnation of the letters by the holy see in 1657, and the sentence of the council of state and the parliament of Aix that they should be burned by the hand of the executioner, could not check their popularity; and 20 years later, as appears from Mme. de Sévigné's correspondence, the *Petites lettres*, as they were now styled, had lost nothing of their original attractions. They may be said to have been the origin of that hostile feeling which, a century later, brought about the expulsion of the society of Jesus from France. They were translated into several languages; and one of the Port Royalists, Nicole, produced a Latin version under the name of Wendrock. Pascal's health continued to fail, and his sufferings scarcely left him any respite; he nevertheless returned to his wonted pursuits, and studied the properties of curves, and especially those of the cycloid or *roulette*. He completed the researches of Galileo, Torricelli, Descartes, and Fermat on this particular point, and in 1659 published his *Traité général de la roulette*. He had also engaged in the composition of a new demonstration of Christianity, but was able only to write occasionally detached thoughts, which were published in 1670, under the title of *Pensées sur la religion*. Modern critics, especially Victor Cousin and Sainte-Beuve, availing themselves of previously neglected sources of information and original manuscripts, have succeeded in giving an outline of Pascal's design. The last four years of his life were an almost unbroken series of bodily suffering and charitable employments; his alms absorbed more than his income. His remains were buried in the church of St. Étienne du Mont, where his tomb is still to be seen.—There are two editions of Pascal's complete works, including his scientific treatises, namely, that of Bossut (5 vols. 8vo, 1779), and that of Lefèvre (5 vols. 8vo, 1819). The *Lettres provinciales*, collected for the first time in 1657, were published in 1684 at Cologne under the supervision of Nicole, with Latin, Spanish, and Italian translations. The *Pensées* were reprinted from the original edition of 1670, first in 1672 (2 vols. 12mo), and with a life of Pascal by his sister, Mme. Périer, in 1684; by Desmolets, with some additions, in 1729; and by Condorcet in 1776. These were the foundation of every subsequent edition until 1842, when Victor Cousin, in a paper read before the French academy, pointed out the alterations and omissions in every one of them, referring at the same time to the autograph manuscript which is preserved in the national library at Paris. In 1844 Prosper Faugère, following up Cousin's suggestions, issued a more correct edition of the *Pensées, lettres et fragments de Blaise Pascal* (2 vols. 8vo). This gave rise to a controversy respecting the work itself and what has been styled the skepticism of Pascal, to which we are indebted for the following works among others: Cousin's *Blaise Pascal* (1849); Sainte-Beuve's *Port Royal* and *Portraits littéraires;* and the abbé Flottes and A. Vinet's *Études sur Pascal* (1846 and 1848). The *Pensées, opuscules et lettres*, edited by Plon in accordance with the original manuscript, appeared at Paris in 1873, and *Pensées de Blaise Pascal, édition de* 1670, with illustrations by Gaucherel, in 1874. The life of Pascal by Mme Périer has been the foundation of numerous later biographies. The *Pensées* and *Lettres provinciales* have been several times translated into English.—The younger sister of Pascal, JACQUELINE (1625–'61), left some miscellaneous works, letters, and verses, which have been collected by Faugère (Paris, 1845), and by Cousin in his biography of her (Paris, 1849).

PASCHAL II., pope (RANIERI OF BIEDA), born in Tuscany, died Jan. 21, 1118. He was a monk of the order of Cluny, and was made cardinal by Pope Gregory VII. He was elected pope on Aug. 13, 1099, and almost immediately renewed the struggle with the German emperor on the subject of investitures. He excommunicated Henry IV. in 1102, whereupon that emperor's son revolted and caused himself to be acknowledged as Henry V.; but in the matter of investitures he proved as unyielding as his father. Paschal proposed a compromise, but the bishops would not consent to it, and when Henry arrived at Rome to be crowned in 1110 the negotiation was broken off, and the pope refused to perform the coronation ceremony. The emperor thereupon seized the pontiff's person, treated him with great indignity, and after keeping him prisoner two months extorted from him the permission to invest the prelates of his kingdom with ring and crosier, provided their election was free, received the imperial crown, and went back to Germany. Paschal, stricken with remorse, wished to abdicate, but was prevented by the cardinals. In 1112 he summoned a council in the Lateran basilica, and submitted his conduct to its judgment. His cession of the right of investiture was solemnly condemned. The result was a rebellion of some of the turbulent German barons, but Henry soon subdued them, and marching upon Rome compelled the pope to flee to Benevento. After the emperor's return, Paschal made vigorous preparations for war, but died before he could take the field. He had also been involved in a dispute with Henry I. of England on the same subject, but a compromise was effected in 1108, whereby the king surrendered the most obnoxious part of the ceremony of investiture, the collation of the ring and crosier, and retained the right of nominating bishops and abbots and exacting from them fealty and homage.

PAS-DE-CALAIS, a N. department of France, formed principally from the old province of Artois, bordering on the strait of Dover (Fr. *Pas de Calais*) and the departments of Le Nord and Somme; area, 2,550 sq. m.; pop. in 1872, 761,158. It is intersected from S. E. to N. W. by a chain of hills which give rise to several rivers, the most important of which are the Scarpe and the Lys, branches of the Scheldt, and the Aa and the Canche, flowing respectively into the North sea and the English channel. These rivers are navigable and are united by canals. The Northern railway and its branches cross the department. Coal is found in small quantities. The soil is marshy in some districts, but is generally fertile. Much land is devoted to sugar beets. The manufactures are of tulles, cotton and linen stuffs and yarns, spirits, leather, gunpowder, soap, glass, and earthenware. The department is divided into the arrondissements of Arras, Boulogne, Montreuil, St. Omer, Béthune, and St. Pol. Capital, Arras.

PASHA, or **Bashaw**, in Turkey, a title given to a governor of a province, a minister, or a naval and military commander of high rank. Pashas of the first rank are called pashas of three tails, that number of horse tails having been formerly carried before them as a standard when they appeared in public. Before those of inferior rank two horse tails were borne. This display has been discontinued except perhaps in some of the Barbary provinces. The title is probably of Persian origin. Some derive it from the Turkish *bash*, a head or chief; others, and among them Vattel, from the Persian *pai*, foot, and *shah*, king, *i. e.*, the king's subordinate. It is very ancient, a similar term, *pe'ha*, being used in the Hebrew Scriptures to designate the viceroys or governors of provinces of the Assyrian, Babylonian, and old Persian empires. The office corresponds to that of the ancient Persian satraps. Until recently the Turkish pashas were entirely absolute in the administration of their provinces, but now their power is checked by local councils and by courts of appeal.

PASHT. See BUBASTIS.

PASIPHAË. See MINOS.

PASKEVITCH, Ivan Federovitch, prince of Warsaw, a Russian soldier, born in Poltava, May 19, 1782, died in Warsaw, Feb. 1, 1856. He was educated at St. Petersburg, became a page of the emperor Paul, and in 1800 entered the army. He served with distinction in the earlier campaigns of the reign of Alexander I., and in those of 1812–'14 at Smolensk, Moscow, Leipsic, and in France. In 1826, on the outbreak of the war against Persia, he was appointed by Nicholas to command under Yermoloff. Having achieved considerable successes over the Persians under Abbas Mirza, he succeeded Yermoloff in the chief command in 1827, and in October captured Erivan. He was rewarded by Nicholas with a million rubles and the title of count of Erivan. Paskevitch now crossed the Aras, and by a rapid advance entered the city of Tabriz. After the peace of Turkmantchai, concluded Feb. 22, 1828, he commanded in the east in the war against Turkey, while the principal Russian army was engaged on the line of the lower Danube and the Balkan. Anapa, Poti, Kars, and Akhaltzik were taken in the summer of that year; and advancing through mountain passes in 1829, Paskevitch surprised a large army under the seraskier. Assisted by the treachery of the janizaries, he took Erzerum, July 9, and pushed forward toward Trebizond, in the vicinity of which he received the news of the peace of Adrianople. Made field marshal and governor of the province of Georgia, he checked the rising of the Lesghian mountaineers in 1830, and in 1831 was appointed commander-in-chief of the armies in Poland. He crossed the Vistula near the Prussian frontier, and advanced on the right bank of that river toward Warsaw, which after a desperate struggle capitulated (Sept. 8). The conqueror received the title of prince of Warsaw, and was made governor of Poland, which was now stripped of its constitutional semi-independence, and transformed into a Russian province, though maintaining some institutions of a separate administration. Paskevitch not only discharged his duty to the entire satisfaction of his master, but by his moderation also gained some popularity among the Polish people. Various attempts at a new rising, the most serious of which was that of 1846, were speedily suppressed. Nicholas, having already attempted an invasion of Hungary from the south in January, 1849, in the ensuing spring placed Paskevitch at the head of an army of more than 200,000 men, which simultaneously crossed the northern, northwestern, and southeastern Carpathians, acting in part independently, and in part in conjunction with the Austrians. No brilliant victory was now achieved by Paskevitch, his principal merit consisting in cautiously avoiding dangers, while the Hungarians were slowly crushed by the weight of converging masses. Görgey's surrender at Világos (Aug. 13) having virtually ended the struggle, Paskevitch returned to Warsaw, where he received new honors. A grand jubilee soon after took place in that city on the 50th anniversary of his entrance into the army, and he was made a field marshal by both the emperor of Austria and the king of Prussia. In April, 1854, he took command of the principal Russian army in the war against Turkey, after the first disastrous campaign on the Danube; but having been wounded before Silistria (June 8), which he failed to conquer, he resigned.

PASQUIER, Étienne, a French author, born in Paris, April 7, 1529, died Aug. 31, 1615. He first appeared in 1549 in the capacity of attorney before the parliament of Paris. After publishing *Le Monophile* and *Les colloques d'amour*, in prose, and several miscellaneous poems, he produced in 1561 the first book of his *Recherches de la France*. In 1564 he was counsel for the university in its lawsuit with the Jesuits. In 1585 he was appointed attorney general to the court of accounts, and in 1588 was elected a deputy to the states general at Blois. He accompanied the royalist members of the parliament who, under Henry III., held their sessions at Tours, and returned to Paris with Henry IV. He now found himself involved in new quarrels with the Jesuits. In 1603 he resigned his office of attorney general to his eldest son, and devoted his later years to revising and publishing his literary works. Most of these were printed in 2 vols. fol. (Amsterdam, 1723). Besides his invaluable *Recherches de la France* in 9 books, they include 22 books of familiar letters, affording ample information upon the manners of the time. Léon Feugère has edited his *Œuvres choisies* (2 vols. 18mo, Paris, 1849), with an excellent biographical and critical notice. Pasquier's fame as a jurist has been fully vindicated by the publication of his *Interprétation des Institutes de Justinien*, edited by M. Charles Giraud (4to, Paris, 1847).

PASQUIER, Étienne Denis, duke, a French statesman, of the same family with the preceding, born in Paris, April 22, 1767, died there, July 5, 1862. Before he became of age he was appointed councillor in the parliament of Paris. His father was beheaded during the revolution, and he himself was imprisoned. Under the empire he became successively master of requests in the council of state, councillor, *procureur général du sceau et des titres*, and prefect of police. Charged by Napoleon with neglect of duty at the time of the conspiracy of Malet in 1812, he was acquitted on trial, and kept in office until the first restoration, when Louis XVIII. appointed him director general of roads and bridges. He stood aloof during the hundred days, and after the second restoration was keeper of the seals and temporary minister of the interior in the cabinet of Talleyrand in 1815, minister of justice in that of Richelieu in 1817, and of foreign affairs in that of Decazes in 1819. He adhered to the revolution of July, 1830, and Louis Philippe made him president of the chamber of peers, with the honorary title of chancellor of France. He had been made a baron by Napoleon, became a count under the restoration, and finally in 1844 received the title of duke from Louis Philippe. Although he published nothing but a collection of discourses delivered in his capacity of minister or peer from 1814 to 1836 (4 vols. 8vo, 1842), he was in 1842 elected a member of the French academy. He left voluminous memoirs.—His grandnephew and adopted son is the present duke Gaston d'Audiffret-Pasquier, brother-in-law of Casimir Périer, an influential statesman, and in 1875 president of the national assembly.

PASQUIN, the name given to a mutilated statue in Rome, standing at the end of the Braschi palace near the piazza Navona. In its immediate neighborhood, in the latter half of the 15th century, was the shop of a tailor named Pasquin, or Pasquino, which was much frequented by people of consequence for the purpose of hearing the current gossip and scandal, and the facetious stories and satirical remarks of Pasquin and his workmen, to whom the utmost license of speech seems to have been allowed. So many caustic personalities emanated from this place, that gradually every bitter saying was attributed to Pasquin or his shop. Etiquette forbade the sufferer by such libels, or pasquinades as they were called, to exhibit any resentment. After Pasquin's death the statue was dug out and set up near his shop, and the populace declared that Pasquin had come to life again. The mutilated torso was called by his name, and thenceforth the custom arose of attaching to it bits of satirical writing, which frequently took the shape of lampoons upon persons in high station, the pope and cardinals being favorite objects of attack. The statue of Marforio, supposed to be that of a river god, which about the close of the 16th century was placed in the *palazzo de' conservatori* on the Capitoline hill, was made the vehicle for replying to the attacks of Pasquin; and other statues in various parts of the city occasionally issued an epigram on public affairs. Pasquin, however, maintained his supremacy over all rivals. The first true pasquinades date from the pontificate of Leo X., and after the lapse of three and a half centuries Pasquin still pursues his ancient avocation. Satirical epigrams however were published previous to Leo's accession.

PASQUOTANK, a N. E. county of North Carolina, bordering on Virginia, and bounded N. E. by the Pasquotank river, and S. by Albemarle sound; area, about 300 sq. m.; pop. in 1870, 8,131, of whom 3,951 were colored. Its surface is low and level, including a portion of the Dismal swamp, and in some places fertile. The Pasquotank river is navigable for small vessels to Elizabeth City, and a branch of the Dismal Swamp canal crosses the county. The chief productions in 1870 were 22,086 bushels of wheat, 434,985 of Indian corn, 23,937 of sweet potatoes, and 110 bales of cotton. There were 738 horses, 1,016 milch cows, 2,094 other cattle, 702 sheep, and 7,868 swine. Capital, Elizabeth City.

PASSAGLIA, Carlo, an Italian theologian, born at San Paolo, near Lucca, May 12, 1812. He became a Jesuit in 1827, studied philosophy and theology in the Roman college, and taught successively canon law and theology there till 1858, when he left the society of Jesus and was appointed by the pope professor in the Sapienza. In the discussions which preceded the proclamation of the dogma of the Immaculate Conception, he and Padre Perrone, another Jesuit, were chiefly conspicuous, Passaglia having published at the expense of the Roman government an elaborate work on the subject, and having prepared the first draught of the bull of definition, *Ineffabilis Deus.* In 1859 he published in Latin an appeal to the bishops of Italy pressing on their attention the claims of Italian unity, and urging the pope to abdicate his temporal power. He also undertook a journey to Turin to induce the ministry of Victor Emanuel to compromise with the pope. Meanwhile his appeal was placed on the Index, and his house was put under the surveillance of the police. These measures compelled him after his return to leave Rome in disguise, and he took up his residence in Turin. There he established the journal *Il Mediatore*, which continued to appear from 1862 to 1866. He was appointed by the king professor of moral philosophy and subsequently of theology in the university of Turin, and was elected a member of the Italian parliament in January, 1863; but there his conciliatory views met with little favor from the majority. He caused no little excitement about the same time by the publication of two papers, the one arguing the obligation of the pope to reside in Rome even after its eventual conversion into the capital of Italy, and the second claiming the right of appeal against papal excommunications, and asserting that they can only be lawfully used for spiritual purposes. He strenuously opposed the declaration of papal infallibility. His principal works are: *De Prærogativis Beati Petri, Apostolorum Principis* (Ratisbon, 1850); *Commentarius Theologicus de Partitione Divinæ Voluntatis* (Rome, 1851); *Pro Causa Italica ad Episcopos Catholicos* (Florence, 1859); and *La questione dell' independenza ed unità dinanzi al clero* (Florence, 1861); besides remarkable treatises on the eternity of future punishments and other theological matters.

PASSAIC, a N. county of New Jersey, bordering on New York, bounded S. W. by the Pequannock and intersected by the Ringwood, Ramapo, and Passaic rivers; area, about 220 sq. m.; pop. in 1870, 46,416. Its surface is diversified, and the soil is generally fertile. It is intersected by the Morris canal and the Erie railroad, the New Jersey division of the New York and Oswego Midland, and the Delaware, Lackawanna, and Western railroad. The chief productions in 1870 were 15,228 bushels of rye, 68,407 of Indian corn, 36,467 of oats, 13,308 of buckwheat, 87,950 of potatoes, 159,418 lbs. of butter, and 11,396 tons of hay. There were 1,539 horses, 3,299 milch cows, 2,402 other cattle, 1,886 sheep, and 1,694 swine. There are a large number of manufactories, chiefly at Paterson, the county seat.

PASSAIC, a river of New Jersey, which rises in Mendham, Morris co., flows S. for a few miles and then E. between Somerset and Morris cos., then N. N. E. between the latter and Union and Essex cos., crosses Passaic co. in an easterly direction, and turning S. after a very devious course of about 90 m. enters Newark bay. It is navigable a short distance for sloops. At Paterson it has a fall of 72 ft. (or 50 ft. perpendicular), affording immense water power, which has been improved by dams and canals. It is much visited by tourists.

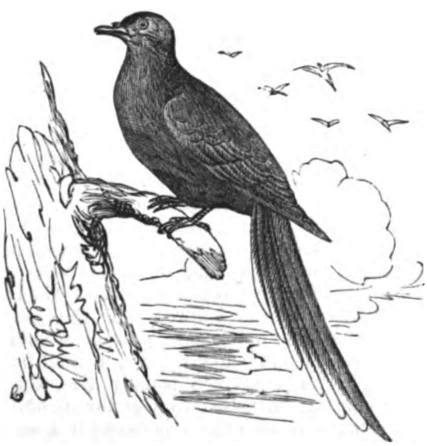
PASSAMAQUODDY BAY, a body of water between the S. E. extremity of Maine and the S. W. corner of New Brunswick, being about 12 m. long and 6 m. wide at the entrance. It receives the waters of the St. Croix and Didgeguash rivers. Campo Bello island lies across the entrance of the bay, and Deer island and a cluster of small islets called Wolf islands lie within it. The bay is well sheltered and not liable to be obstructed by ice; and it has good harbors and a sufficient depth for the largest vessels. The tide rises 25 ft.

PASSAROVITZ (Serb, *Pozharevatz*), a town of Servia, 37 m. E. S. E. of Belgrade; pop. about 7,000. It contains a court and several schools, but is chiefly noted for the peace concluded here July 21, 1718, between Austria and Venice on one side and Turkey on the other, in which the Porte, humbled by the victories of Prince Eugene, consented to considerable cessions of territory on both sides of the lower Danube.

PASSAU (anc. *Batava Castra*), a town of Bavaria, at the confluence of the Inn and the Danube, 92 m. E. N. E. of Munich; pop. in 1871, 13,389. It is divided by the rivers into three parts, the central one being the town proper, and the others, Innstadt on the Inn, and Ilzstadt on the Danube, being suburbs. The Ilz, a tributary of the Danube, flows between Ilzstadt and Anger. Two castles and eight smaller works of defence constitute Passau one of the most important strongholds on the Danube. It has a cathedral, a public library, a theatre, an old abbey, a bronze statue of King Maximilian Joseph, several schools and hospitals, a lunatic asylum, manufactories of porcelain, leather, tobacco, beer, paper, iron, and copper, and an active trade on the Danube. Its bishops were formerly independent princes, but it was secularized in 1803, and incorporated with Bavaria in 1805. In 1552 a treaty guaranteeing religious freedom to the German Protestants was concluded here between the emperor Charles V. and Maurice of Saxony.

PASSAVANT, Johann David, a German art historian, born in Frankfort in 1787, died there, Aug. 12, 1861. He studied art in Paris and Rome, and became inspector of the Städel museum in his native city, an office which he held till his death. He painted several works of merit, and wrote *Rafael von Urbino und sein Vater Giovanni Santo* (3 vols., Leipsic, 1839–'58); *Die christliche Kunst in Spanien* (1853); *Le peintre-graveur* (in French, 6 vols., 1860–'64); and several other works.

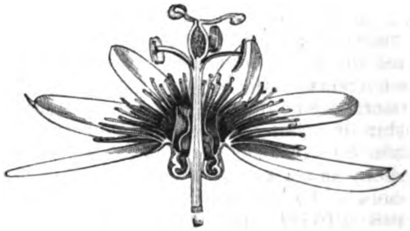
PASSENGER PIGEON, or **Wild Pigeon** (*ectopistes migratoria*, Swains.), a well known columbine species peculiar to North America, where it exists in immense numbers. The family characters are given under Pigeon; the generic characters are, a very small head, short bill, long wings, the first primary the longest, tarsi very short, and tail very long and wedge-shaped. The male is about 16½ in. long, with an alar extent of 25 in.; the general color above is grayish blue, some of the wing coverts being marked with black spots; throat, fore neck, breast, and sides light brownish red, and the rest of the under parts white; lower hind neck with golden, green, and violet reflections; quills blackish, bordered with pale bluish, the larger coverts whitish at the tip; two middle tail feathers black, the others pale blue at the base, becoming white toward the end; the bill black, iris bright red, and feet carmine purple. The female is smaller, and of duller colors. Their rapid and long continued flight enables them to pass over, and their keen vision to survey, a vast extent of country, when migrating at irregular periods in search of the mast which constitutes their principal food; the flight is high or low according to the region; for an account of the rapidity of their flight, see Carrier Pigeon. After feeding they settle on the trees, and toward sunset depart for their roosting places, often hundreds of miles distant; they build in forests where the trees are high, without much reference to season, and in places where food is abundant and water not far off; the flesh is dark-colored, and highly esteemed; according to Audubon, they lay two eggs. These birds are found throughout temperate North America to the high central plains. Their numbers are absolutely countless both in the roosting and breeding place. Wilson describes one of their breeding places in Kentucky extending 40 m. through the woods and several miles wide, every tree bearing nests wherever they could be placed; they appeared about April 10 and left with their young before May 25; they were killed in immense numbers by the people gathered from a wide extent of country. Wilson calculates the length of a column of these birds which passed over him



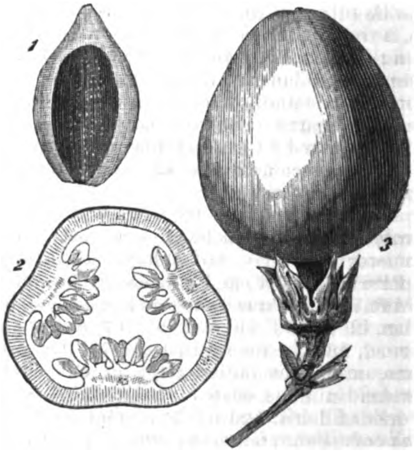
Passenger Pigeon (Ectopistes migratoria).

at 240 m., and estimates the number of pigeons in it at more than 2,000,000,000.

PASSION FLOWER (*passiflora*), a genus of plants so named because the early Spanish missionaries regarded them as emblematic of the passion or crucifixion of Christ and its attendant circumstances. It contains about 120 species of mostly climbing, herbaceous, or woody plants, all of which, save a few in Asia and Australia, belong to the American continent, especially to the tropical portions. Five species are found in the Atlantic states, one extending as far north as Pennsylvania and Illinois. In some species the flowers are large and showy, and among the most brilliant of the occupants of our plant houses; in others they are small and inconspicuous; and in all the structure is striking and peculiar. The leaves in some are remarkable for their form or markings, several species being cultivated for their foliage only; the leaves, generally alternate, are entire or variously lobed or parted, with petioles which are often furnished with glands, and with or without stipules; the tendrils by which the plants climb are rarely wanting, and, being mostly axillary, are regarded as abortive flower stalks, as it is not rare to find them bearing flower buds. The flowers are axillary and solitary, or in racemes, the flower stalk or pedicel usually bearing three leafy bracts embracing the base of the flower. The structure of the flower, which is much out of the ordinary way, will be best understood by aid of a longitudinal section, as given in the engraving. The calyx consists usually of five sepals, united below to form a short cup or tube; the free expanded portion is colored like the petals within, or on the upper side, and often having on the outside, just below the tip, a small hook or claw. The petals are usually five, sometimes wanting, attached to the throat of the calyx tube, and with them is inserted a series of thread-like processes in two or more rows, forming a compound fringe, called the crown or ray; to this the great beauty of most of these flowers is chiefly due, as aside from the unusual appearance it imparts, sometimes extending beyond the petals, and again quite short, it is often beautifully colored and marked, frequently in contrast with the color of the rest of the flower; the real nature of these filaments has been much discussed, but Dr. M. T. Masters, who has given special study to the family, regards them as abortive stamens, a view confirmed by the structure in related genera. The stamens are of the same number as the calyx divisions and opposite them; their filaments are united below to form a tube sheathing, and more or less united to the stalk which supports the pistil, but distinct above, their free portions widely spreading and terminated by large oblong anthers hung by the middle. In the centre of the flower arises a stalk or column (gynophore), which is a prolongation of the receptacle and bears at its apex the pistil, consisting of a one-celled ovary, with three club-shaped styles, terminated by large button-like stigmas. The fruit is a berry, with a more or less hard rind, pulpy within, and containing numerous seeds on three parietal placentæ, each seed surrounded by a pulpy covering (*arillus*); the fruit in many species is edible. From this outline of the structure, the origin of the name passion flower will be understood; in the palmate leaves of the plant are seen the hands of Christ's persecutors, and in the conspicuous tendrils the scourges; the ten parts of the flower envelope, calyx and corolla together, stand for the disciples, two of whom, Peter and Judas, were absent; the fringe represents the crown of thorns, or according to some the halo of glory; the five anthers are symbolic of the five wounds, and the three styles with their capitate stigmas stand for the nails, two for the hands and one for the feet, with which the body was nailed to the cross.—The showiest of our native species, *passiflora incarnata*, is found as far north as Kentucky and Virginia, and is especially abundant further south, where it often remains in cultivated land as a weed; its stems, trailing on the ground or climbing upon corn and other crops, are regarded as troublesome; it has a perennial root, and spreads widely by means of underground stems; its leaves are three-cleft,

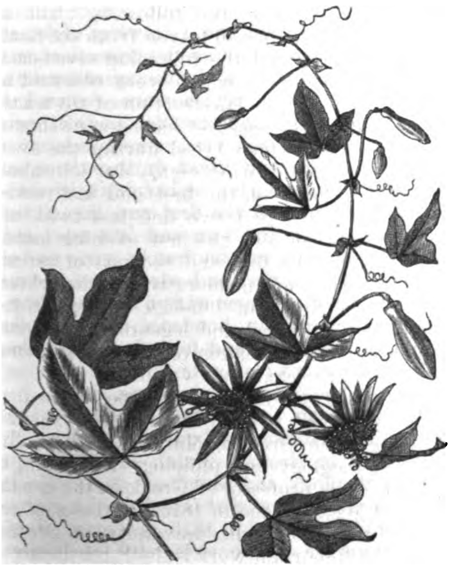


Passion Flower, longitudinal section.



1. Seed surrounded by aril. 2. Transverse section of ovary. 3. Fruit.

and the flower, 2 to 3 in. broad, pale purple or nearly white, with a purple or sometimes flesh-colored crown, is sufficiently handsome for cultivation; the fruit, known throughout the southern states as "maypops," is about the size of a hen's egg, dull yellow when ripe, and edible; an extract of the leaves and an infusion of the root have been used medicinally, particularly as a vermifuge. This species, especially if the roots are covered with litter during winter, is sometimes hardy in northern gardens, and is a fine vine for a low trellis, though its running under ground makes it troublesome, as the shoots in spring will often appear a yard or two away from the place where the plant stood the season before. The yellow passion flower (*P. lutea*), growing as far north as Pennsylvania and Illinois, is a smaller plant, and its greenish yellow flowers, scarcely an inch across, are more interesting than beautiful. Our other three species, natives of Florida, are not showy or of any known use. *P. suberosa* has greenish yellow flowers and small purple fruit; *P. angustifolia* has yellowish flowers half an inch across, and fruit the size of a pea; and *P. Warei* is equally insignificant in appearance. The commonest exotic species is the blue passion flower (*P. cærulea*) from South America, which has been in cultivation for nearly two centuries; it is hardy in parts of England and on the European continent, but not in our northern states; it is cultivated in cool greenhouses, and treated as a bedding plant; if planted out in warm weather, it grows very rapidly and produces a profusion of its handsome flowers, which are very pale blue, with a purple centre and a blue crown, which has a white band in the middle. Something over 100 named passion flowers are in cultivation, including hybrids and varieties from seed; of these only a few of the more common and striking can be noticed. The edible passion flower (*P. edulis*), called with several others granadilla, is a very old greenhouse plant, and, where climbers are desired, useful for its rapid growth, dark green abundant foliage, and numerous white and blue, sweet-scented flowers; its purple fruit, the size of a goose egg, is esteemed for dessert. (See GRANADILLA.) The winged (*P. alata*) and the four-angled (*P. quadrangularis*) passion flowers both have four-sided branches, the angles of which are winged; both are free-flowering stove climbers, with large, sweet-scented, red or crimson flowers, in which the crown is variously colored; the two species differ in the structure of the crown, and the last named, called the large granadilla, has an edible fruit 6 or 8 in. in diameter; a variety, *P. Decaisneana*, with larger and more showy flowers than either, is supposed to be a hybrid between these two. The large-fruited passion flower (*P. macrocarpa*) has fruited in England, producing enormous berries weighing as much as 10 lbs. each. Among the other choice species and varieties in cultivation are *P. princeps*, *Buonapartea*, *kermesina*, *coccinea*, *sanguinolenta*, and *circinnata*, the last named remarkable for the very long and slender wavy rays to the crown. Among those cultivated for their beauty of foliage is *P. trifasciata*, in which the dark olive-green leaves have three broad bands of greenish white corresponding to their three lobes, but the flowers are small and not showy. A few species are annuals; among them *P. gracilis*, remarkable for the rapidity of the movements of its tendrils, is one of the species observed by Darwin in studying the movements of climbing plants; the internode carrying the upper tendril made six revolutions at an average of 1 h. 1 m.; a single touch near the tip of a tendril when in its most sensitive condition caused it to curve, and in two minutes it formed an open helix. The genus *tacsonia* (from *tacso*, the Peruvian name for the plants) differs from *passiflora* chiefly in having a long calyx tube, often over 3 in. long; their habit of growth is similar, and their flowers often exceedingly brilliant; their horticultural uses are identical with those of the passion flowers.—In cultivation at least, some passion flowers are singularly self-sterile; though an abundance of active pollen is produced, this will not fertilize the pistils on the same plant, but it will those on a different species, and the pistils which refuse to accept their own pollen readily become impregnated by that from another species. *P. racemosa*, *cærulea*, and *alata*, in the botanic garden at Edinburgh, refused for many years to bear fruit, though the flowers of each frequently had their own pollen applied to them artificially; but when these three were crossed in various ways with the pollen of either of the others, fruit was



Blue Passion Flower (Passiflora cærulea).

abundantly produced. It is probable that this state of things does not exist among these plants in the wild state, but that, as the reproductive function is often affected by slight external causes, self-sterility in these plants has been induced by the unnatural conditions of cultivation. This view is supported by the fact that *P. alata* in some greenhouses is inveterately self-sterile, while in other places it fruits abundantly by the aid of its own pollen; and a plant known to be self-sterile was by grafting upon another species rendered ever afterward self-fertile. But little is certainly known about the medicinal qualities of the passion flowers; the roots and leaves of several are employed in their native countries as expectorants, narcotics, and anthelmintics; the root of one of the granadillas, *P. quadrangularis*, very common in greenhouses, is said to be diuretic, emetic, and so powerfully narcotic as to be regarded as poisonous.—Passion flowers are increased with the greatest ease from cuttings of the young wood, and they may also be raised from seeds. If the plants are not set in the ground of the greenhouse, they should have very large pots or boxes, as the roots require much room.

PASSIONISTS, an order of regular clerks in the Roman Catholic church, founded in 1720 by Paolo Francesco Danei, known as St. Paul of the Cross. He was born Jan. 3, 1694, at Ovada, near Genoa, and died Oct. 18, 1775. Having conceived the idea of a body of missionaries uniting all the austerities of a cloistered life with the active duties of the pastoral ministry, he retired in 1720 to a hermitage with a few companions. Their saintly life, the good effected by them among the neighboring population, and the recommendation of the bishops, induced Benedict XIII. to ordain them priests in 1727. The order, now consisting of 11 priests, was approved by Benedict XIV. in 1741; and in 1746, under the name of "the Discalceated Clerks of the Cross and Passion of our Lord Jesus Christ," Danei established his first convent and novitiate on the Celian hill in Rome; and this establishment continued to be the mother house of the order till its suppression in 1873. Twelve convents were also founded by him in various cities of Italy, which became centres of home missionary labor, and a Passionist sisterhood was established at Corneto. The order and its constitutions were solemnly confirmed by Pius VI., Sept. 15, 1775. The Passionists, though much esteemed in Italy, did not extend beyond it till the present century. In 1841 the first house of the order was founded at Highgate, near London, by Father Ignatius (George Spencer); and they multiplied rapidly, extending to Ireland and Australia. The first Passionist convents in the United States were established at Birmingham, Pa., in 1852, and at West Hoboken, N. J. They also own establishments in Pennsylvania and Maryland. The habit of the Passionists is a cassock of coarse black cloth, a large crucifix borne in the girdle, and an emblem of the passion wrought in red on the left breast. They go barefooted, rise during the night to sing the canonical hours, and devote themselves especially to giving "missions" or spiritual retreats. Their founder, Paul of the Cross, was beatified in 1853 and canonized in 1868.

PASSION PLAYS. See Miracles and Moralities, and Ober-Ammergau.

PASSION WEEK. See Holy Week.

PASSOVER (Heb. *pesa'h*, from *pasa'h*, to leap over, to pass by; Aram. *pas'ha*; Sept. *πασχα*; Vul. *pascha*), a Hebrew festival, instituted by Moses in commemoration of the Israelites remaining intact on the night of the destruction of the first born in Egypt, immediately preceding the exodus from that country (Ex. xii.). Originally it was observed by sacrificing passover lambs toward the evening of the 14th of the first Hebrew spring month (now Nisan), and eating them on the following night, as well as by excluding all leaven from the meals of that evening and the following seven days, the first and last of which were observed as holy. Since the final destruction of the temple of Jerusalem, the passover has been celebrated by eating unleavened bread during the seven (out of Palestine during eight) days, by abstinence from labor on the first and last (out of Palestine on the first two and last two), and by the observance on the first evening (out of Palestine on the first and second) of various domestic rites commemorative of the deliverance from Egyptian bondage, including the recital of Scriptural and legendary narratives and familiar conversation on the same national event, and the chanting of psalms.

PASSOW, Franz Ludwig Karl Friedrich, a German philologist, born in Ludwigslust, Sept. 20, 1786, died in Breslau, March 11, 1833. He studied theology and philology at Leipsic, in 1807 became professor of Greek in the gymnasium at Weimar, and in 1815 professor of ancient literature in the university of Breslau. His most important work is the "Dictionary of the Greek Language" (4th ed., Leipsic, 1831).

PASSPORT, a document given by the authorized officer of a state, which permits a person or persons therein named to pass or travel either generally, or through a country named, or on certain routes, by land or water. Passports must have been used by all civilized governments to some extent and in some form; but in England and in the United States they have not been used within those countries, though their governments give them to those of their citizens who purpose to travel abroad. The United States secretary of state is charged with the duty of issuing passports, and authorizing and regulating their issue by diplomatic or consular agents. Any one who issues a passport without authority, or who has authority and issues a passport to one not a citizen, is liable to punishment by fine and imprisonment. Passports are also given by collectors of ports to all vessels of the United States, and if any such vessel sails without a passport the master is liable to a fine of $200. Every passport gives the name, age, residence, and occupation of the holder, with a description of his person and appearance, which is intended to afford the means of identifying him. It is supposed to assure the holder of the support of his own government, and asks for him and entitles him to the protection of all governments or nations at peace with his own.—In many of the European states the passport system has until recently been kept up, to afford the authorities means of surveillance over suspicious characters, and thereby to prevent conspiracies against the government, or provide the means of detecting them. The belief that passports have little efficacy for this purpose has been confirmed by recent experience; and the growing conviction that they are not so useful as they are inconvenient and oppressive has generally led to a practical abandonment of their use. One may now travel over Europe, with the exception of Russia, without once exhibiting his passport, unless circumstances direct suspicion toward him.

PASTA, Giuditta, an Italian singer, of Jewish origin, born at Saronno, near Milan, in 1798, died at her villa near Lake Como, April 1, 1865. She received her first musical education from Bartolommeo Leotti, chapelmaster in the cathedral of Como. At the age of 15 she was admitted to the musical conservatory of Milan, and in 1815 began her public career at the minor theatres in Leghorn, Parma, and Brescia. The next year, appearing at the Italiens in Paris, she failed to attract notice; she was equally unsuccessful in London, and decided upon returning to her native country for further study. When, in 1819 and 1820, she appeared in Venice and Milan, she was greeted with applause. Returning to Paris in 1821, and visiting Verona during the session of the European congress in 1822, she was remarkably successful. Her triumph in London was scarcely less brilliant, and for several years she continued to sing alternately in Paris and London. In 1827, some business difficulty having occurred between her and Rossini, then director of the Italian opera in Paris, she accepted an engagement at Naples, where Pacini composed for her his opera of *Niobe*. Her dramatic powers did not please the Neapolitans, though they were afterward fully appreciated at Bologna, Milan, Trieste, and Verona. At Milan Bellini wrote for her *La sonnambula* and *Norma*. Pasta won her last triumphs at Vienna in 1832. Her voice, which had always been more remarkable for energetic than melodious qualities, was now impaired; and her last engagement on the Italian stage in Paris, in 1833 and 1834, was not on the whole successful. In 1836 she retired to her villa on the lake of Como. Her last engagement, from which she received $40,000, was with the opera in St. Petersburg in 1840.

PASTEUR, Louis, a French chemist, born in Dôle, Dec. 27, 1822. He took his degree in 1847, was professor of physical sciences at Dijon from 1848 to 1849, and afterward of chemistry at Strasburg till 1854, when he organized the new faculty of science at Lille. In 1857 he went to Paris as scientific director of the normal school; subsequently he was elected a member of the institute; and toward the end of 1863 he assumed the chair of geology, physical science, and chemistry at the school of fine arts, and afterward that of chemistry at the Sorbonne. He acquired great celebrity, and received in 1856 the Rumford medal for his researches on the relation of the polarization of light with hemihedrals in crystal and other researches, a French prize for his works on fermentation in 1859, and a Jecker prize in 1861 for his chemical labors. In 1873 he was elected an associate member of the academy of medicine, and the government granted him in 1874 a pension of 20,000 francs. He is most widely known for his opposition to the doctrine of spontaneous generation, and his researches in fermentation. He maintains that all fermentations are processes connected with life, and not of spontaneous production, but that the living organism must proceed from a parent of the same kind. Therefore fermentation can never take place if all access of germs to a fermentable substance is prevented. He has invented a new process for the fermentation of beer founded upon his theories, a part of which consists in excluding atmospheric air from the fermenting wort, as he maintains that fermentation can be conducted without the presence of free oxygen, and under certain circumstances proceeds more satisfactorily in an atmosphere of carbonic acid. He discovered that glycerine is one of the products of fermentation. (See FERMENTATION.) He also made interesting researches on racemic acid, discovering that when racemate of ammonium is mixed with a small quantity of beer yeast and exposed to a temperature of 85° F. fermentation takes place, and the racemic acid is converted into lævotartaric acid. His principal works, besides his contributions to the *Annales de chimie et de physique*, are: *Nouvel exemple de fermentation déterminé par des animalcules infusoires pouvant vivre sans oxygène libre* (Paris, 1863); *Études sur le vin, ses maladies, &c.* (1866); *Études sur le vinaigre, &c.* (1868); *Études sur la maladie des vers à soie* (2 vols., 1870); and *Quelques réflexions sur la science en France* (1871).

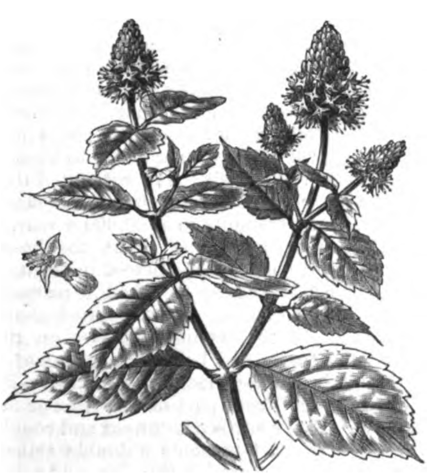
PASTILLE. See PERFUME.

PATAGONIA, a territory of South America, extending from lat. 38° 42′ to 53° 52′ S., and from lon. 63° 9′ to 75° 30′ W. It is bounded N. by the Argentine Republic, from which it is separated by the Rio Negro, E. by the Atlantic, S. by the straits of Magellan, separating it from Tierra del Fuego, and W. by the Pacific and the republic of Chili, the dividing line with which last is the cordillera of the

Andes. The maximum length from N. to S. is 1,050 m.; the maximum width from E. to W. near the northern extremity is 475 m., and near the southern extremity 175 m.; area about 350,000 sq. m. The coast line is indented by numerous inlets, particularly S. and W., where the seaboard is the most irregular of any on the South American continent. The largest gulfs on the Atlantic are San Matías, Nuevo, and St. George; and the chief ports are those of San Antonio, San José, Desire, San Julian, and Santa Cruz. On the Pacific are the gulfs of Trinidad, Peñas, Corcovado, and Ancud, the two latter being more properly straits separating the island of Chiloe from the mainland. None of the ports are described as being commodious for shipping. Islands are extremely rare on the E. coast; but the Pacific coast is fringed by a continuous chain, mostly in distinct groups. Wellington, by far the largest island, between lat. 47° 30′ and 50° 5′, has a maximum length of 165 m. from N. N. W. to S. S. E., and a mean breadth of nearly 40 m. To the north of this island is the gulf of Peñas, to the south that of Trinidad, and it is separated from the mainland by Mersier channel. Others of the larger islands are Queen Adelaide, Hanover, and those of the Chonos or Guaytecas archipelago. The eastern shores of most of the islands are high and rocky, and the western slopes covered with a comparatively rich arboreal vegetation, while the western edges are bare and subject to frequent storms. The only important peninsula on the Atlantic is that of Valdés, sometimes called San José; in the straits of Magellan is that of Brunswick, and on the Pacific that of Taytao. On the E. coast, the more prominent points and capes are Médano at the embouchure of the Negro, Norte and Delgada on Valdés peninsula, Tres Puntas and Virgins at the entrance to the straits of Magellan, and Cape Froward in Brunswick peninsula, the southernmost point of the American mainland. The capes on the W. coast, though numerous, are unimportant.—Patagonia, in common with the remainder of the western continent lying W. of lon. 62°, is traversed from S. to N. by the Andes, which here lie nearer to the coast than almost anywhere else S. of the isthmus of Panama. From the southern extremity of the territory to Mt. Burney, which has an elevation of 4,800 ft., there are few summits above 3,000 ft.; but the snow line in this region of short summers and long winters being under 2,000 ft., the character of the mountains is Alpine, and glaciers are frequent, at times even down to the sea level in the valleys. Northward from Mt. Burney the Alpine character is more continuous, especially in that part of the cordillera sometimes called the Sierra de Sarmiento. According to Agassiz, the glaciers, which here evidently had a greater extension at an earlier period, have left indications of a movement from S. to N., and were connected with a polar ice sheet similar to that the traces of which are so apparent in the northern hemisphere. An observer from high summits is struck by the number of small lakes at all elevations, and still more by the slender cascades formed by the water rolling over the transverse ridge by which almost every valley is barred at different heights. The loftiest peaks are between lat. 43° and 45° S., where the most conspicuous eminences are Mt. Cay and the volcanoes Yantéles (8,000 ft.) and Corcovado. The latter volcano was formerly, though erroneously, considered the loftiest mountain in the world below lat. 42° S. Like its neighbor Minchinmadiva, however, about one degree further N., it more properly belongs to Chili than to Patagonia, though commonly assigned to the latter. A system of spurs detached from the Andes in lat. 41° S. curves northward to the very banks of the Rio Negro, and again bends S. E., trending toward the Atlantic coast, where it forms a littoral zone extending into the peninsula of Valdés. Terraced rocky ranges skirt the Atlantic coast from the peninsula just named to the southern extremity of the continent, rising here and there to a considerable elevation, as in the peaks Salamanca (lat. 45° 30′), Rivers (47° 30′), and Wood (48° 20′), and the singularly shaped hills inland from Possession bay, known as Mt. Aymond and the Asses' Ears, supposed to be the easternmost of a chain of small extinct volcanoes. The mountains of the middle region of the straits, comprised in Brunswick peninsula, range from 1,000 to 3,000 ft. above the sea, but without glaciers, snow remaining only in patches on their summits. A low transverse chain, parallel to the bed of the Santa Cruz river in lat. 50° S., unites in Mt. Stokes, nearly 100 m. from the Pacific coast, with the true Andine cordillera. The space comprised within the mountains first traced embraces the sterile plains of Patagonia, consisting of a bed of shingle worn smooth and accumulated by the waves of the sea.—The principal rivers are those emptying into the Atlantic. The Negro, forming the boundary with the Argentine Republic, disembogues at El Cármen de Patagones, after a generally eastward course of over 500 m., throughout nearly the whole of which it has been navigated. The Chupat, descending from the Andes, traverses the plains eastward and discharges into the ocean at the port of the same name. The St. George, from the same chain, crossing the territory in a like direction, empties into St. George's bay in lat. 46° 30′. The Santa Cruz, after the Negro by far the most important, as it is navigable throughout at all seasons, the depth being nowhere less than 9 ft., forms the eastern outlet of Lake Viedma (lat. 49° 30′ S.), whence by a gentle curve S. E. it flows to its estuary, into which it discharges through a mouth 3 m. wide. The tide here rises from 35 to 50 ft. twice in the 24 hours. The few streams to the Pacific have short precipitous courses. Of the lakes existing in the interior, Viedma only is thoroughly known; it was explored in October, 1874, by Lieut. Feilberg of the Argentine navy, who found it to be 27 m. long and 100 m. in circumference, with a western drainage to the Pacific 32 m. distant. The explorer reached it by the Santa Cruz, and on his return descended the river (which has a current of 6 m. an hour) to Port Santa Cruz at the mouth in 26 hours. The Rio Gallegos flows into the Atlantic at the port of the same name, in lat. 51° 50′ S. Some of the lagoons in the north are not perennial, but disappear on the subsidence of the floods at the end of the rainy season.—The geology of Patagonia is at once simple and interesting. From the Rio Colorado, in the Argentine pampas, southward almost to lat. 51°, extends one great deposit including many tertiary shells, all apparently extinct, the most common of which is a colossal oyster often a foot in diameter. Overlying these beds, the thickness of which at Port San Julian is over 800 ft., is a peculiar soft stone, really pumiceous, though including gypsum and somewhat resembling chalk, and one tenth of whose bulk is composed of infusoria, among which last Ehrenberg discovered 30 oceanic forms. The white beds are everywhere capped by a mass of gravel, forming probably, according to Darwin, one of the most extensive beds of shingle in the world. At the Santa Cruz river it reaches to the foot of the Andes, the thickness of the stratum half way up that river being over 200 ft.; and it probably extends everywhere to that cordillera, whence have been derived the well rounded pebbles of porphyry; thus its mean breadth may be computed at 200 m., and its mean thickness at 50 ft. The whole land from the basin of the Rio de la Plata to Tierra del Fuego has been raised in mass, to a height varying between 300 and 400 ft., within the period of the now existing sea shells; the old and weathered shells on the surface of the upheaved plain still partially retain their colors. The upward movement has been interrupted by at least eight long periods of rest, during which the sea ate deeply and uniformly into the land, forming at successive levels the rows of terraced escarpments. The lowest of these step-like plains is 90 ft. high, and the highest near the coast 950 ft. The plain beyond Lake Viedma, at the foot of the Andes, slopes up to an elevation of 3,000 ft. At Port San Julian, in some red mud capping the gravel on the 90 ft. plain, Darwin found half a skeleton of the *macrauchenia Patachonica*, a remarkable quadruped, as large as a camel; and Capt. Sullivan of the British navy has since discovered, imbedded in regular strata on the banks of the Rio Gallegos, numerous large fossil bones, and some smaller ones, presumed to have belonged to an armadillo. The middle portion of the straits region, from Peckett's harbor to Port Gallant, is mostly of secondary formation, as far as determined by Mr. Pourtalès, who visited the country during the Hassler expedition (1871-'2), the coal of Punta Arenas (Sandy Point) being cretaceous. The mountains of the west are for the most part composed of primitive rock, immense fragments of which are numerous around the upper course of the Santa Cruz. According to Darwin, it would be possible to prove that the bed of that river was once the bottom of a strait here joining the Atlantic and Pacific oceans, like that of Magellan.—The mineral resources of Patagonia, though supposed by geologists to be comparatively extensive, are imperfectly known. Gold was found in 1874 in the region of the Gallegos and Santa Cruz rivers, and near Sandy Point; but mining operations begun in that year were shortly suspended. Coal is abundant in Brunswick peninsula, though but small quantities have hitherto been extracted. Some diamonds have been discovered in the Gallegos river, and pronounced to be similar to those of Brazil.—The climate in the north is extremely cold in winter and warm in summer; and it is very dry, there being often no rain during nine months. In the south there is more moisture; the rainy and windy seasons are spring and summer; the remainder of the year is characterized by calm, interrupted only by light winds. Thunder is not heard oftener than once in five years. Smallpox is unknown; rheumatism is common; and the climate is in general remarkably salubrious.—One of the striking characteristics of Patagonia is the similarity of the productions throughout, with the single exception of the straits region. The same stunted plants are everywhere to be met with on the arid shingly plains, and the same spiny shrubs in the valleys. Some thorn-bearing shrubs occur likewise in the north, where, not a tree being seen, they form, with salt pools here and there, the only relief to the dreary monotony of the grass-covered plains. In the east the vegetation consists of grasses and a few leguminous and composite plants and shrubs, with sweet berries of various kinds. In the south the forests present four species of trees: two beeches, the antarctic (*fagus antarctica*) and the evergreen (*F. betuloides*); the Winter's bark (*drimys Winteri*), known for the stimulant tonic properties of its aromatic bark; and the *libocedrus tetragona*, akin to the Chilian tree furnishing the valuable alerce timber. Shrubs and climbers abound in the thickets, the ornamental species including the *Fuchsia*, *Desfontainea*, *Perrottetia* with small globular berries, *philesia* with its bell-shaped, rose-red, waxy flowers, and many others. Nearly all the species of the Patagonian flora are also indigenous to Chili, and are found in every part of the moist country from the north of the republic to Magellan straits. Ferns, mosses, and lichens are found in great abundance; and among the marine weeds should be mentioned the gigantic *macrocystis pyrifera* so common in the straits and on the W. coast, and useful to navigators by indicating the presence of submerged rocks.—Agriculture, hitherto confined to the colonies at Sandy Point and Port Santa Cruz, has only prospered in potatoes and garden vegetables; but it was hoped that Swiss immigrants, expected in 1874, would by the use of fertilizers, and with efficient culture, succeed in raising wheat and barley, both of which were found to take three years to come above ground at the now abandoned colony of Chupat.—The puma lurks along the forest margins, or seeks, in the vicinity of the rivers, lakes, and pools, his favorite prey, the guanaco. The latter animal roams in numerous flocks through the plains, never approaching the woods. Capybaras are very plenty, and the vizcacha and tucutuco, burrowing rodents, are here almost as common as in the Argentine pampas. Two species of deer are mentioned. A small delicately shaped fox, likewise very abundant, derives its support exclusively from several species of mice, externally characterized by large thin ears and a beautiful fine fur, which swarm among the thickets in the valleys. Skunks and cavies are to be met with everywhere. Among the amphibia are otters and two kinds of *phocidæ* distinguished as eared and hair and fur seals; whales are not uncommon; and many varieties of excellent edible fish, including salmon, abound in some of the rivers and along the coasts. Shell fish are in great variety. The condor and some carrion hawks, especially the *carrancha* (*polyborus Braziliensis*) and the *chimango* (*P. chimango*), follow and prey upon the guanacos; large flocks of geese (*chloëphaga Magellanica* and *C. antarctica*) feed upon the plains; and penguins are numerous on the shores of the straits and elsewhere, as are also cormorants, ducks, oyster-catchers, and sea gulls. The forest glades are enlivened by the warbling of small birds of many kinds, and the gorgeous plumage of paroquets and humming birds. The ostrich (*rhea Americana*) frequents the great central plains, where it is taken by the Indians with the lasso and bolas.—Recent travellers enumerate nine tribes of Patagonians S. of the Rio Negro: the Poyuches, Puelches, Cailliheches, Cheuches, Cañecaueches, Chaoches, Huilliches, Dilmaches, and Yakanaches. They all speak the same language, said to be akin to and strongly resembling the Araucanian of Chili, with slight dialectic modifications. They are tall (the men, according to Capt. Mayne, averaging 5 ft. 11 in., or 5 in. over the mean stature of Englishmen), robust and powerful in proportion to their size, with large heads, high cheek bones, black eyes expressive of savage cunning, and straight, coarse, black hair, separated in front by a band and falling in wild disorder over the shoulders and back. The women are relatively much smaller, and with few exceptions ill-looking. Their costume usually comprises a beaded patch of cloth upon the head, the hair being divided into two long braided tresses reaching to the loins; huge ear rings with great square pendants attached, necklaces, armlets, and anklets of beads; and a woollen garment extending from the shoulders to below the knees, and fastened at the waist with an ornamental girdle and at the top with a *tupu* or brooch often of silver. The men swathe the middle of the body; and their mantle, not always worn save in the south, is made of guanaco skins sewed together, with a hole for the head, and extending below the knee. Both sexes paint the body with a species of volcanic earth furnished by the Araucanians, and pluck out all the hair of the eyebrows, beard, and all parts of the trunk. The Indians of the north are admirable equestrians, and pass most of their time on horseback; their offensive weapons are the lance, the sling, and the bow and arrow, all of which they use with dexterity and address, as they do also the lasso and bolas in the chase of the guanacos, ostriches, and cattle and horses on the plains. Their herds of these last and their flocks of sheep are numerous, being mainly stocked from the nearest Argentine farms, on which they make frequent raids. In the south the cattle are not so plenty, and there are no horses. The dress of the Indians is warmer, but, like their northern brethren, they are given to the use of intoxicating drinks, which, with tobacco, trinkets, and other commodities, they procure from the white colonists in exchange for ostrich feathers. The Fuegians, though of the same race as the Patagonians, are much smaller of stature, and differ essentially from them in their manner of living. One religion prevails through the whole of Patagonia; the people believe in two supreme beings, Vitauentru, revered as the author of all good, but to whom no fixed place of abode is assigned, and Huacuvu or Gualichu, the source of all human ills, and ruler of the evil spirits supposed to wander to and fro on the face of the earth. They have no priests, but there are diviners (of both sexes), whose pretended power to see into the bowels of the earth is gradually losing prestige with the multitude. Most of the tribes now possess cooking utensils, but the food, in the north mainly consisting of horse flesh, is still eaten almost raw, though with abundance of salt. They are fond of drinking the blood of animals; and after each meal they smoke tobacco prepared with ox manure in a stone pipe, inhaling vast volumes of smoke until insensibility and even convulsions ensue. They have two religious festivals, one in honor of each of their divinities. They bury their dead with great solemnity, sacrificing the horse of the deceased (if a man) on his grave, besides which they leave a quantity of slaughtered animals for his food. They are fond of dancing, during which the women sing and beat a sort of tamborine, accompanied by the discordant notes of a reed fife, their only musical instrument. Altogether the Patagonians have dwindled down to a few thousand.—This region was discovered in 1520 by Magalhaens, who named it Patagonia (the country of the large-footed), in al lusion to the presumed large size of the feet of the natives, judging from footprints seen upon the coast; but this was an unfounded presumption, the people being remarkable for proportionately small feet. The coast was visited by Drake in 1578, by Byron in 1764, and by Cook in 1774. Since that time the territory has frequently been explored more or less extensively by a number of voyagers: by Darwin in 1834, Musters in 1869, and members of the American Hassler expedition in 1871. The most accurate descriptions of the Patagonians are from the pens of Bourne, an Englishman, and Guinnard, a Frenchman, detained as captives by the natives, the first three months and the second three years (1856–'9). Three vocabularies of the Patagonian language have been compiled: by Pigafetta in the 16th century, by Schmid in 1863, and by Musters in 1870. In earlier days the territory nominally formed part of the viceroyalty of Buenos Ayres. It has since been disputed by the Chilians and Argentines, but the latter have consented to the occupation by the former of the whole of the Pacific coast region. The Chilians established a colony at Port Famine in 1843, but removed it to Sandy Point on the E. shore of Brunswick peninsula in 1850; since then it has been comparatively prosperous. The population of the colony, which is administered by a governor, was officially given in 1873 at 869; and a contract was signed for the introduction of 100 Swiss families, expected to arrive in the following year. The value of the exports (mainly skins) for 1873 was $34,632, and of the imports $48,534, almost exclusively from Valparaiso. In that year 86 steamers, 10 sailing vessels, and 10 war steamers touched at the port. Farm lots of 50 acres each had been given to 117 settlers. The Chilian government has initiated numerous improvements tending to facilitate steam navigation through the straits; and $25,000 was appropriated in 1873 for a lighthouse to be built on Cape Virgins, at the Atlantic entrance thereto, a step regarded at Buenos Ayres as an audacious infringement upon Argentine sovereignty. At Port Santa Cruz there has been an Argentine colony for several years; but besides a fish-oil factory in the vicinity, no profitable industry is carried on there. A Welsh colony, founded under Argentine auspices in 1865 on the Rio Chupat, proved unsuccessful, and the settlers removed to the province of Santa Fé shortly afterward. Viedma, who visited Patagonia in 1779, and pushed his explorations inland to the foot of the Andes, built several forts along the coast; and these, with the settlements above enumerated, are the only civilized establishments in this dismal region. The Chilian congress in 1864 decreed the concession of 75,000 sq. m., embracing both coasts, to a Mr. Tornero, on condition of his introducing 10,000 colonists and keeping four steam tugs in the straits; but that and several similar schemes have never been carried out. It has been asserted that serious efforts to colonize Patagonia permanently must always fail, and that the territory will be unpopulated for centuries to come.

PATAPSCO, a river of Maryland, which rises in Carroll co., flows southward and then southeasterly between Baltimore co. and Howard and Anne Arundel counties, and passing Baltimore opens into a broad estuary which enters Chesapeake bay 14 m. below the city. Its total length is about 80 m., and it affords valuable water power. It is navigable for large vessels to Baltimore.

PATCHOULI, a perfume, the name of which is said to be from *patchey elley*, the East Indian name for the leaves of *patchey*. About the year 1825 there appeared in commerce the dried and broken leaves of a plant from the East Indies, which had a very powerful odor; these were recognized as belonging to some labiate plant, but it was not till 1844, when the patchouli plant flowered in France, that its proper genus was known, and it was described by Pelletier as *pogostemon patchouly*. The genus *pogostemon* consists of herbs and somewhat shrubby plants, and is entirely Asiatic; the plants have the general aspect of coarse labiates, and their flowers are borne in dense axillary and terminal spikes; the patchouli grows in Penang, the Malay peninsula, and Silhet; it is a shrubby herb about 2 ft. high, with broadly ovate, petioled leaves 4 in. long, slightly lobed and scallop-toothed on the margins; the flowers are white, tinged with purple. The plant is prepared for commerce by cutting and drying in the sun, taking care not to dry it so much as to crumble; the dried tops, which are about a foot long, are packed for exportation in boxes containing 110 lbs. each. The odor of the leaves is to some persons quite insupportable, while others are passionately fond of it; the perfume has long



Patchouli (Pogostemon patchouly).

been popular in India, and soon became common after its introduction into Europe and this country. It is due to a volatile oil, of which the plant by distillation yields about 2 per cent.; this, as *essence de patchouly*, is also found in commerce. The odor is peculiar and remarkably persistent. Sachets of patchouli are small bags filled with cotton and the broken leaves, and used to perfume drawers and to put away with woollen clothing and furs to keep out moths; the essence is sometimes used alone, but more frequently employed in combination with other essences to make compound perfumes. India ink and India shawls owe their peculiar odor to this perfume, and in India it is used to scent smoking tobacco. Accounts are given of injurious effects resulting from an excessive use of patchouli as a perfume, such as nervous debility and loss of appetite and sleep.

PÂTÉ DE FOIE GRAS (Fr.), literally, a pie of fat liver, made generally of the liver of the goose, and in Nérac, France, of the liver of the musk duck. Strasburg and Toulouse are famous for goose-liver pasty tureens. The method of producing the abnormally large liver is to take a young bird in autumn, confine it in a close cage which permits but little movement, generally in a dark place, and feed the bird with beans, or more commonly with maize. During the last three or four weeks the bird is "crammed" twice or three times a day with parboiled maize seasoned with salt, the crammer forcing the food down its throat. Under this unnatural treatment the liver swells and attains a weight of from one to two pounds, and in exceptional cases even three pounds. The bird's throat is cut, and after being drawn the body is hung in a cold, airy place till the liver acquires sufficient firmness to be taken out. The pastry cook seasons and spices it, adds truffles and other ingredients, bakes the contents of the tureen, and pours over the mass a layer of fresh hog's lard to keep it from contact with the air. It is estimated that the trade of the Strasburg pastry cooks alone in these tureens amounts to $500,000 a year.

PATELLA (Lat., a kind of dish), the kneepan, a chestnut-shaped bone placed in front of the knee joint, the cavity of which it protects from external violence. It is attached above to the tendon of the extensor muscles on the front of the thigh, and below, by means of a strong and broad ligament, to the tuberosity on the upper and front part of the tibia or leg bone. Its anterior surface is convex and rough, while its back part presents a double articular surface, invested with a thin layer of cartilage, corresponding with the articular surface of the front part of the lower extremity of the femur. The patella thus takes part in the formation of the knee joint. It is liable to fracture and to lateral dislocation; but neither of these accidents is very frequent.

PATENTS, Law of. Letters patent are granted by the governments of various countries to secure to inventors, their heirs and assigns, for a specified period, the exclusive right to new inventions and discoveries useful to industry. The system was not known to the ancients, and in many countries does not now exist. It is much favored in the United States, is common in Europe and the English colonies, and has been introduced into several South American countries. In England the authority to grant patents for useful inventions rests upon a proviso in the statute of monopolies passed in 1624. This act prohibited the granting of exclusive privileges in trade, but excepted "letters patent and grants of privilege for the term of one and twenty years or under, heretofore made, of the sole working or making of any manner of new manufacture within this realm, to the first and true inventor or inventors of such manufactures." In France the earliest law in favor of new inventions was passed in 1791. The patent system of the United States has grown up under a positive grant in the federal constitution. The first act was passed in 1790. The grant of a patent is in the nature of a contract between the government and the inventor, the former giving to the latter the exclusive usufruct of the invention for a limited term in consideration of the benefit received from it by the public. This benefit results from the immediate practice of the invention under the patent, the privilege of practising it after the expiration of the patent, and the general encouragement given to industry. But it is disputed whether patent laws are for the public good. Neither Switzerland nor Holland has such laws. In Prussia the granting of patents is not regarded with favor by the government; and in England, Belgium, Saxony, and some other countries, the abolition of the system has been advocated.—The United States patent office in Washington is a bureau of the interior department; here are kept all records, books, models, drawings, specifications, and other things pertaining to patents. The officers are all paid, and comprise a commissioner, assistant commissioner, and three examiners in chief, appointed by the president with the consent of the senate; also one chief clerk, an examiner in charge of interferences, 24 principal, 24 first assistant, 24 second assistant, and 24 third assistant examiners, a librarian, a machinist, and a large clerical force. The examiners in chief must be persons of competent legal knowledge and scientific ability. The general law in force relating to patents is that of 1870.—*Who may obtain a Patent.* Any person, whether citizen or alien, whether resident in this or in a foreign country, being the original and first inventor or discoverer of anything patentable, may obtain letters patent therefor. A patent will issue to the assignee of the inventor, but the application must be made by the latter, and the assignment must be first recorded. In case of the death of the inventor, his legal representatives may apply for the patent. Joint inventors are entitled to a joint patent; but the independent inventors of separate and independent improvements in the same machine cannot obtain a joint patent for their distinct inventions. To be entitled to a patent as the inventor or discoverer, the claimant must be the real author of the invention; and he is the real author who has conceived the essential plan or principle of the discovery. The inventor may, without prejudice to his rights, receive suggestions, hints, or practical aid from others; and he may avail himself of the practical knowledge or manual skill of others necessary to bring his invention into practical form. Thus Morse conceived the idea of the electric telegraph; and it was held by the supreme court of the United States that the information obtained by him from men of science and mechanicians for the purpose of giving practical embodiment to the conception "neither impairs his rights as an inventor nor detracts from his merits." But if the principle or plan of the invention is substantially communicated to the patentee, who contributes only the ordinary skill of the constructor or mechanic, he will not be regarded in law as the inventor.—*What may be patented.* Any "art, machine, manufacture, or composition of matter, or any new and useful improvement thereof," may be the subject of a patent. By "art" is meant the mode, process, or manner of doing a thing; the term "manufacture" embraces fabrics or substances, but not machinery; and "composition of matter" is usually applied to medicines, and less frequently to compositions used in the arts, as metallic alloys, paints, chemical compounds, &c. A machine must not be a mere function or abstract mode of operation, separate from any particular mechanism, but a function or mode of operation embodied in mechanism designed to accomplish a certain effect. If this effect is new, the mechanism which produces it may be new or old; or a new machine which produces an old effect may be patented. The invention may embrace the entire machine, or one or more parts, or it may consist in a combination which may be entirely of old and well known things, or new ones, or old and new together; but the combination must be new, and must produce a new and useful result, not due to the separate action of any one of the devices used, but to the coöperative action of all. In this case the patent protects only the combination and the new elements; any one may use the old devices either separately or in a different combination. A patent for an improvement covers only the improvement, and does not give to the patentee a right to use the original invention. The improvement of an existing machine must be real and material, and not merely a change of form. The improvement need not be very great. The difference between the old and the new may to all appearance be very slight, and yet be of great importance. Thus, when it was the practice to make cloths water-proof by immersing them in a solution of soap and alum, a patent was obtained for immersing cloths first in a solution of alum (with an ingredient or two added), and afterward in a solution of soap; and this patent was sustained, because it was proved that the immersion into the separate solutions successively made the cloth much more completely and permanently water-proof. Since 1842 the law has provided for issuing patents for designs used in manufactures. In England this class of objects is protected by the law of copyright. By the act of congress of 1870 letters patent may be obtained for any new and original design for a manufacture, bust, statue, alto rilievo, or basso rilievo; or for the printing of woollen, silk, cotton, or other fabrics; any new and original impression, ornament, pattern, print, or picture intended for any article of manufacture; or any new, useful, and original shape or configuration of any article of manufacture. For a statement of what is protected by the law of trade marks see TRADE MARKS.—The essential requisites of every patentable invention or discovery are novelty and utility. A valid patent will not issue to an applicant if what he claims as new was, before his invention, invented or discovered by another in this country, or if he has abandoned it to the public. Inventors, however, may permit the public use or sale of their inventions for two years before applying for a patent, without prejudicing their rights; but if this use extends over a longer period, or if it amounts to an abandonment, a valid patent will not issue. In regard to a prior invention, it is not sufficient that another may have previously conceived the idea that the thing patented could be done; he must have reduced his idea to practice and embodied it in some useful practical form; it must have been not merely an experiment, but a completed invention or discovery put into practical form and capable of working successfully. Whether it was in actual use is immaterial except so far as that fact may go to determine whether the invention was completed and capable of use. Whoever restores an abandoned or lost art or invention may obtain a patent for it. If a person having made a discovery or invention applies for a patent in this country, his claim will not be defeated by the fact that the same invention has been previously known and in use in a foreign country, unless it has been patented or fully described in some printed publication. Any inventor or his assignee may obtain a patent for an invention which he has first patented in a foreign country, provided it has not been in public use in the United States for more than two years prior to the application. In this case the patent will expire at the same time as that in the foreign country, or, if there be more than one foreign patent, at the same time with the one having the shortest term; but in no case will it last longer than 17 years. Thus if a patent is granted in this country for an invention previously patented in Prussia for three years, the American patent will not continue beyond that period.—An invention is new, in the sense of the patent law, when it is substantially different from anything previously known. In determining the question of novelty, the inquiry frequently arises whether the supposed invention is really novel, or whether it simply consists in a double or analogous use or application of something already known. The application of an old contrivance to a new use, or the producing of a new result or effect by known means, is not the subject of a patent if such new use or effect is analogous to that already known. Thus it has been held that a patent will not issue to the person who first applies to railroad cars a kind of wheel that has been used for other conveyances; nor for a process of curling palm leaf for mattresses after hair had been prepared by the same means. Such uses may be new and useful, but they are analogous to the old, and therefore not patentable.—The discovery of a principle, a natural law, scientific truth, or property of matter cannot in the abstract be the subject of a patent. But whoever makes a new and useful application of any of these things by embodying the principle or law in mechanism, or describing a new process by which the discovery may be made of practical utility, may obtain a patent for his invention, which consists not in the abstract principle but in its practical application. Thus the properties of electricity, the law of contraction and expansion produced in metals by heat and cold, the principle of centrifugal force, and the qualities of heated air, are well known things which cannot be patented; but their novel application to practical uses by described means have come within the scope of the patent laws. The discovery of ether as an anæsthetic, and its application in surgical operations to alleviate pain, was held to be not patentable, on the ground that the claim was for a new effect "produced by old agents, operating by old means upon old subjects;" it appearing that the existence of ether had been before known, as well as a peculiar effect produced when introduced into the lungs of animals. The principle, law, property, &c., may be newly discovered or well known; and so the mechanism or process or means may be new or old. But it is essential that the practical application to the purpose specified shall be new; that the patentee shall describe some means of applying the principle to a useful purpose; and that the means described shall be such that the practical application may be made by a person of ordinary skill. The law, property, or quality of matter is common property, which can be appropriated by any one to a new purpose by a new adaptation. No one can acquire exclusive property in the electric fluid, or in any one of its properties or powers; or in the sun's light, or that actinic power by which pictures are painted or impressed. But any one may devise a way of working with electricity, and that way shall be his; and so he may discover a way of making pictures or representations by light, and that way also shall belong to the inventor. And then any other person is at liberty to discover some other way of using either of these forces or qualities of nature.—The statute specifies that the invention shall be "useful;" but any degree of utility is sufficient, and patents are often granted for things of little or no value. The law simply requires that the invention may be capable of some practical use, however trivial, which is not noxious or mischievous. If the invention be new and useful, it is immaterial how much or how little thought, ingenuity, skill, labor, or money has been bestowed upon it. Whether it was the result of repeated experiments and profound study, or was merely an accidental discovery, is immaterial. The law looks to the result, and not to the manner in which it was produced.—*How Letters Patent may be obtained.* The applicant for a patent is required to file in the patent office a petition on oath or affirmation that the petitioner, if the inventor, believes himself to be the original and first inventor of the invention, and that he does not know and does not believe that it has been known or used before; and this must be accompanied by a full description of the invention, with drawings and a model where the case admits of it. The application must be in writing, addressed to the commissioner of patents, and signed by the inventor if living, or otherwise by his executor or administrator. Even when the application is made by an assignee, it must be signed by the inventor if living. The specification is a written description of the invention or discovery, and of the manner and process of making, constructing, and using it. It must be so full, clear, and exact as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, compound, and use the same. If a machine, the principle and best mode of operation must be fully explained, so as to distinguish it from other inventions. The description is followed by the "claim," in which the applicant must particularly specify the part, improvement, or combination which he claims as his own invention or discovery. Where there are drawings, the specification must refer by letters and figures to the different parts. In the case of a composition of matter, specimens of the composition and of the ingredients sufficient in quantity for the purpose of experiment, must accompany the application. The chief objects of the specification are to make known the precise nature of the invention, and to enable the public from the specification itself to practise the invention after the expiration of the patent. The object of the claim is to fix with accuracy the extent of what is claimed as new. Two or more separate and independent inventions cannot rightly be claimed in one application; but if they relate to the same subject and are necessarily connected, they may be included in one application. It is essential that the specification be a full and intelligible description of the invention. Obscurity or ambiguity in this respect may defeat the patent. It is also of prime importance that the claim be coextensive with the invention, and discriminate distinctly between the old and what is claimed as new. If it appear that anything claimed is not new, the patent will be broader than the invention and therefore void. It will also be a fatal defect if the claim is for a machine when the invention is a process; or for the discovery of a law in nature or property of matter, when the invention is the practical application of such law or property. Cases are numerous in which patents have been declared void on account of defective specifications. It sometimes happens that two or more persons claim each to be the first inventor of the same thing. Then the commissioner declares a case of "interference" to exist, and after due notice to the parties, they are heard in support of their several claims before a primary examiner, and if either party is dissatisfied with his decision, before the board of examiners in chief, and if still dissatisfied, before the commissioner on appeal. This may happen although one of the claimants has previously received a patent; for the commissioner, if he comes to the conclusion that the second claimant has a better right, or an equal right, will give him also a patent, and leave the two to determine by legal measures which is valid. Appeals from the commissioner may be taken in all cases except interferences to the supreme court of the District of Columbia. If a patent is void by reason of a defective specification, or because the patentee claimed as his own invention more than he had a right to claim as new, he may surrender his patent to the commissioner, and file with him a new and corrected specification, and the commissioner may thereupon issue to him a new patent, provided the error has arisen from inadvertence, accident, or mistake, and without any fraudulent or deceptive intention. Or the patentee may make a disclaimer in writing of such parts of the thing patented as he does not wish to claim; and this disclaimer, being duly received and recorded, shall have the same effect as if it had been originally a part of such specification. Even without such surrender or disclaimer, a patent may still be sustained by the court for any material and distinguishable part for which the claim was valid, although there are other parts of the claim to which the patentee is not entitled; but he can recover no costs for the infringement of such a patent without surrender or disclaimer. There is a very wise provision to meet the frequent case where an inventor wishes to secure his right, but is not ready to present a full and complete specification, and needs time for experimenting or other purposes. He may file a *caveat*, which will be placed in the secret archives of the patent office; and if there be any application within a year for anything which appears to interfere with his claim, he shall have notice and may appear and prove priority; and by a second caveat he may renew it for another year, and so on successively. It is to be noticed, however, that a caveat cannot be filed by an alien, unless he has resided in the United States one year, and has made oath of his intention to become a citizen, according to law. Even where caveats are not taken out, all pending applications are regarded as so far confidential that, until after a patent is issued, no information will be given to any one but the claimant respecting the existence of any application, or any questions which may have arisen in relation to it. To guard against deception of the public as to what inventions are protected by patent, all patented articles are to be marked with the date of the patent, and any person who shall put any word or remark upon a thing not patented which shall indicate that it is the subject of a patent, or put upon it the name of any patentee without his consent, is liable to a penalty of $100 for each offence. A fee of $15 is required on filing the application, and $20 when the patent issues; $10 on filing a caveat, and $30 when application is made for a reissue. The fees for designs are $10 for 3½ years, $15 for 7 years, and $30 for 14 years.—Patents may be assigned by instruments in writing, which must be recorded in the patent office within three months from execution. The assignment may be of the whole or an undivided part of the patent, or a license may be given conferring the exclusive right to make, use, and sell the thing patented within any specified part of the United States. —*Term.* By the act of 1836 patents were granted for 14 years, and provision was made for an extension in certain cases for 7 years more. In 1861 the original term was fixed at 17 years, and extensions were prohibited for patents granted after that year. This provision was retained in the act of 1870, so that patents are now issued for 17 years without the privilege of renewal. Patents granted prior to 1861 might formerly be extended by the commissioner after hearing the parties interested, and after public notice to others disposed to object, provided he was satisfied that the patentee, without neglect or fault on his part, had failed to obtain from the use and sale of his invention or discovery a reasonable remuneration. The last patent coming within the provisions of the law in regard to extensions expired March 2, 1875, so that no extension can now be granted except by special act of congress. Such acts have been passed, but the practice is liable to abuses. Patents for designs may be taken out for 3½, 7, or 14 years, as the applicant may elect.—*Infringement.* To determine what constitutes an infringement is one of the most difficult matters connected with the subject of patents. So much depends upon the points of resemblance and difference between the infringing and infringed matter, that few general rules can be given to determine the question. The statute affords no definition; it grants to the patentee, for a term not exceeding 17 years, the "exclusive right to make, use, and vend" his invention or discovery throughout the United States. It is therefore an infringement either to make, use, or sell without license what another has patented. In determining the question of infringement, the leading inquiry is whether there is substantial identity between the two things; if so, there is an infringement. If there is a difference, the inquiry is whether it is substantial or merely colorable. When a machine or a process is patented, it is not an infringement to sell the article produced, unless the product is also patented. Thus, where one person owned the patent right for using a machine for making bedsteads in a certain county, it was held to be no infringement for another person operating a similar machine in an adjoining county to sell his bedsteads in the county first named. A combination is not infringed by the use of one or more of its parts, if those parts are not specially patented, and if they do not substantially constitute the combination. As to infringement by the sale of the thing patented, it must be a sale of the whole thing, and not of the different parts or materials out of which it may be made, unless they be sold with the intent that they should be put together and so make the whole machine. The owner of a patented machine may prolong its existence and utility by repair as long as he can; but he may not construct a new machine under pretence of repairing the old one. A patentee is seldom permitted to call that an infringement which imitates nothing that is directly and explicitly stated in the specification. In case of infringement, the statute provides for the recovery of damages in the circuit courts of the United States. An injunction may also be obtained restraining the alleged offender from further using or selling the patented article. Frequently an injunction will not be granted until the plaintiff's right and the defendant's wrong doing have been established at law. But when the infringement is certain, a court of equity will proceed at once; and sometimes, on petition of the patentee, they direct a trial at law, and order the defendant to keep an exact account of all that he makes or sells in supposed infringement of the patent, to be rendered if the trial results in establishing the infringement.—The average annual number of applications for American patents is about 20,000. In 1874 there were 21,602 applications, and 13,599 patents were granted, including reissues and those for designs; 2,561 applications were allowed for which patents did not issue on account of non-payment of fees. The number of caveats filed was 3,181. The receipts of the patent office amounted to $738,278, and the expenditures to $679,288. From 1836 to 1875 more than 158,000 patents were issued. Since 1866 illustrated specifications have been printed by the government; but information concerning patents granted prior to that year is accessible to the public only in manuscript records, the commissioners' annual reports, judicial reports, &c.—*Foreign Patent Systems.* The English patent system and that of the United States have much in common, but there are some marked differences. The former dates from the reign of James I.; but in 1852 the entire system was regulated by act of parliament. The term "manufactures" in the statute of monopolies has been construed to embrace anything made by the hand of man, including machinery and products, as well as processes or methods of producing manufactured articles, and improvements of the same. In recent statutes the term "inventions" is used, which has the same comprehensive meaning. Prior to 1852 separate patents were necessary for England, Ireland, and Scotland, and were obtained at a cost of between £300 and £400. One patent is now sufficient for the whole United Kingdom. It may be obtained for 14 years, and at the expiration of that term the owner, by petition to the queen in council, may have an extension for 7 or even 14 years. The cost of obtaining a patent for 14 years amounts to about £175; but the patentee may secure a term of three years for £25, or seven years for £50 more, to be paid at the end of the first three years. At the expiration of seven years he may extend the patent for seven years more, by the payment of £100. By filing a provisional specification, the applicant may secure protection for his invention for six months. The commissioners of patents are the lord chancellor and master of the rolls, the law officers of the crown for England, Scotland, and Ireland respectively, and such other persons as the queen may appoint. A marked difference between the English and American system is, that the former gives a patent to any person who first introduces an invention into the realm, without regard to who is the inventor or in what country the invention may have been patented. The practice therefore has been common, when an invention has been patented or made public in a foreign country, for some other than the owner to send a description to England and obtain a patent for it there. In 1875 a bill was introduced into the house of lords by the lord chancellor to amend the law concerning patents by removing several important defects, one of the most prominent of which was the granting of letters patent without any examination into the merits or novelty of the invention. It was proposed in the new law to issue patents only after examination of the invention; to abolish the practice of granting patents to those who merely introduce inventions from abroad; and to fix the term at 14 years without privilege of extension. The policy of granting patents has been recently much questioned in England. The number of English patents annually issued is between 4,000 and 5,000. Only 68 applications were rejected in 1872, and 78 in 1873. About 70 per cent. of these are allowed to expire at the end of three years, and about 20 per cent. of the remainder cease to exist at the end of seven years. In 1873 the receipts from patents amounted to £144,760, which exceeded the cost of issue by £90,000. In the United States the number of patents annually issued is much greater than in England, but the surplus receipts are materially less, because the fees required are much smaller, and from 10 to 15 American patents may be required to cover an invention which would be embraced in one English patent.—In France patents are granted for 5, 10, or 15 years, and cannot be extended beyond the last named term except by a special law. The invention must be new and applicable to industry. Pharmaceutical preparations or remedies of any kind cannot be patented; they can only be protected by the law governing trade marks. The application for a patent is made to the prefecture of the department in which the applicant resides, and embraces a petition to the minister of agriculture and commerce, a specification of the invention or discovery, and the necessary drawings or specimens. The demand must be limited to a single principal object, and the term desired must be specified. The tax is 500 francs for 5, 1,000 for 10, and 1,500 for 15 years, payable in annual instalments. Letters patent are issued without previous examination, their validity being at the risk of the patentee. Failure to work the inventions for two years causes forfeiture of the patent. Alterations, improvements, or additions to the invention while the patent is in force may be protected by a certificate, which is obtained by the payment of 20 francs, and expires with the original patent; or a new patent may be taken out for such improvements. Foreigners may obtain patents upon the same terms as natives. Patents are granted to the authors of inventions already patented abroad; but they expire with the foreign patents.—The imperial constitution of Germany of 1871 declares that questions concerning patents and patent laws are reserved to the Reichstag; but no uniform law for the German empire has yet (1875) been made, and patents are issued by the several states pursuant to their respective laws. The patent system of Prussia has some peculiar features. The invention or discovery must be new and must have industrial value. Inventions of an artistic nature are not patentable. Patents are granted only to natives or to the citizens of such countries as have acquired special rights by treaty, as in the case of British subjects. Foreigners not within this rule may obtain a patent by appointing a Prussian as their representative, in whose name the patent will issue. Any person, native or foreign, may obtain a patent for an invention patented abroad, provided no description of the invention has been published in Prussia or elsewhere, and that the invention has not been in use in Prussia. As the details of patents granted in England or the United States are promptly published, the English or American inventor who wishes to have his invention patented in Prussia must make contemporaneous application there and at home. The application for a Prussian patent must be made to the minister of commerce in Berlin, and must be accompanied by full descriptions, and also models if necessary. These are kept from the knowledge of all persons except those whose special duty it is to examine and report upon them. All applications are carefully examined by a special department under the ministry of commerce, consisting of nine members under the presidency of a director of the ministry. These decide whether a patent shall issue, and also for what period, which must not be for less than six months nor more than 15 years, but may be for any period within these limits. The usual term for which patents are granted is three years. The cost of obtaining a patent is almost nominal. The patentee is required to bring his invention into use in Prussia within the time fixed by the minister, which is usually six months and never more than a year; non-compliance with this requirement will render the patent void. The patentee also loses his rights if at any time during the term for which the patent is granted the invention remains unemployed for 12 consecutive months. A Prussian patent gives to the owner the exclusive right of making the article patented, and in the case of machinery the sole right of using it when made; but the patentee cannot prohibit the sale or importation of an article which is like that for which the patent is granted. Infringing articles, in the case of a second offence, are liable to confiscation. The number of Prussian patents annually granted is less than 100; the number of applications is about 700 or 800. In Bavaria patents are granted for any number of years not exceeding 15; the cost ranges from $10 41 for the first to $114 54 for the 15th year. In Saxony the term is five years, but may be prolonged for five more.—In the Austro-Hungarian empire the period for which patents are granted is limited to 15 years; but a patent may be taken out for a shorter term at the option of the patentee. The taxes for 15 years amount to $341: for the first five, $48 72; second five, $97 44; third five, $194 88. The patentee may be a native or a foreigner. The application is made to the political authorities of the district or the provincial governors, and by them forwarded to the ministry of commerce. It must be accompanied by an intelligible description of the invention, and models and drawings if practicable. The description will be kept from the knowledge of the public at the request of the applicant. If the patentee fails to make use of his patent for one year from the date of issue, or subsequently allows two consecutive years to elapse without working his invention, the patent becomes void. A foreign invention can only be patented in case it is patented abroad; and the patent will be granted only to the foreign patentee or his assignee.—In Belgium patents are granted without previous examination, for a term of 20 years. The author of an invention already patented in a foreign country may obtain a patent, which will expire with the foreign patent. The fees are small, and are paid in progressive annual amounts: first year, $1 90; second, $3 80; third, $5 70; and so on to the 20th year, for which the tax is $38. Non-payment of this tax causes forfeiture of the patent. The proprietor of a patent must use his invention in Belgium within a year from the time it is introduced in a foreign country; if the patented article is used in a foreign country, and not in Belgium, the patent will be annulled unless the owner justifies such non-use. From 1,500 to 2,000 patents are annually granted in Belgium.—In Denmark patents usually run for 3, 4, or 5 years. Important inventions are protected for 10, and in special cases 15 years. Patents are not granted to foreigners for more than 5 years. In Sweden, inventors only, whether Swedes or foreigners, are entitled to letters patent, the term being not less than 3 nor more than 15 years.—In Russia patents are granted for 3, 5, or 10 years. Any person who introduces an invention patented in a foreign country may receive a patent, but it will not continue longer than the foreign patent, and in no case will it last longer than 6 years unless the application is made by the inventor, in which case the term may extend to 10 years. The cost of a patent for 10 years is $357.—In Portugal patents are granted for a term not exceeding 15 years; in Italy not more than 15 years nor less than one year,. the tax being annual and proportional. Greece has no patent system; monopoly is obtained only by a special law. Brazil issues patents for from 5 to 20 years; Venezuela, not more than 15 nor less than 6.—Curtis's "Law of Patents" (4th ed., 1873) is the standard American work on this subject. The latest English treatise (1874) is by Agnew. The proceedings at the patent office in Washington, with descriptions of all inventions patented, are published weekly in the "Official Gazette," and since the beginning of 1875 all decisions of the United States courts in patent cases. In vol. iv. of that publication (July to December, 1873) may be found statements of the patent laws of various foreign countries.

PATERCULUS, Caius Velleius, a Roman historian, born about 19 B. C. He attended C. Cæsar in his eastern expedition in A. D. 2, and subsequently served under Tiberius in Germany, Pannonia, and Dalmatia. He was quæstor in 7, and prætor in 15. His Roman history, a brief compendium, of which a part is lost, appears to have been written in A. D. 30, and bears the title of *C. Velleii Paterculi Historiæ Romanæ, ad M. Vinicium Cos. Libri II.* It is chiefly remarkable for its excellent style. The manuscript was discovered in the monastery of Murbach in Alsace by Beatus Rhenanus, who printed it at Basel in 1520.

PATERSON, a city and the capital of Passaic co., New Jersey, on the Passaic river, at the falls, and on the Morris canal and the Erie, the Delaware, Lackawanna, and Western, and the New Jersey Midland railroads, 11 m. N. of Newark, and 17 m. by rail N. W. of New York; pop. in 1850, 11,334; in 1860, 19,586; in 1870, 33,579, of whom 12,868 were foreigners, including 5,124 natives of Ireland, 3,347 of England, 1,429 of Germany, and 1,360 of Holland. The river here describes a curve, forming the boundary of the city for more than 9 m. on all sides except the south, and is crossed by 14 bridges, several of which are fine structures, one just above the falls having a single span of 260 ft. The falls have a perpendicular descent of 50 ft., and the scenery in the vicinity is very picturesque. There is a small and rugged park around them, and in the S. E. corner of the city, on a hillside sloping down to Dundee lake, a fine sheet of water 3 m. long and ½ m. wide, is Cedar Lawn cemetery. Paterson is well built, with paved streets, generally wide and straight and lighted with gas, and contains a large number of handsome residences, particularly in Broadway. The principal public buildings are the court house and jail, market, city almshouse, first national bank, and the opera house. In the vicinity of the falls are a monument to the citizens who fell in the civil war and a tower overlooking the city and surrounding country. Paterson is the residence of many persons doing business in New York, but it owes its prosperity chiefly to its manufactures, for which the falls afford abundant power. The two most important industries are the manufacture of silk goods and locomotives. The silks include ribbons, machine twist, sewing silk, dress silks, handkerchiefs, veils, neckties, scarfs, fringes, braids, bindings, &c. The dyeing of silk is also an important branch of the business. There are about 25 corporations and firms engaged in the silk manufacture and three locomotive works, besides which there are five cotton mills, producing cloths, yarns, shoe lacings, tape, mosquito nettings, buckrams, &c.; a steam fire engine manufactory, a bridge-building company, several iron works and rolling mills producing forgings and machinery of various kinds, a woollen mill, print works, a paper mill, a manufactory of Whitney sewing machines, two of wire, one of brass steam and gas fittings, one of shawls, one of linen thread, one of ingrain carpets, two of chemicals, and several of flax, hemp, and jute goods, embracing twine, cordage, bagging, and ladies' hair switches. The locomotive works in prosperous times employ about 3,000 hands, but since the financial panic of 1873 this business has been much depressed. In that year the capital invested in the manufacture of silk amounted to $4,000,000; the number of hands employed was 4,000, and the amount paid in wages $2,000,000. All branches of iron work employed 3,758 hands, paying wages to the amount of $2,511,000, and producing articles to the value of $8,517,000. In flax, hemp, and jute manufactures there were employed 1,390 hands, and goods were produced to the value of $1,748,000; the wages paid in these branches during the year amounted to $413,384. The city contains two national banks with a joint capital of $550,000, a loan and trust company, two savings institutions, and a fire insurance company. It is divided into nine wards, is governed by a mayor and board of aldermen, and has a small police force and a good fire department, with a fire alarm telegraph. It is supplied with water from three reservoirs near the falls, into which it is pumped from the river by the Passaic water company, a private corporation. Two lines of horse cars accommodate local travel. There are nine large public school buildings, with good graded schools, including a high school; two daily and four weekly (two German) newspapers; and 39 churches (in several of which the services are conducted in Dutch), viz.: 4 Baptist, 1 Congregational, 3 Episcopal, 1 Independent, 1 Jewish, 10 Methodist, 7 Presbyterian, 7 Reformed, 4 Roman Catholic, and 1 Swedenborgian.—Paterson was founded in 1792 by a company incorporated for manufacturing purposes, under the auspices of Alexander Hamilton. The act of incorporation as a town was signed by Gov. William Paterson on July 4 of that year, and in honor of him it was named. It received a city charter in 1851.

PATERSON, William, founder of the bank of England, and of the Scottish colony of Darien, born according to tradition at Skipmyre, Tinwald parish, Dumfriesshire, about 1660, died in January, 1719. He is said to have been among the Covenanters who were persecuted by Charles II. To escape from these persecutions he went to London as a merchant, and also visited America, where he acquired from the buccaneers much information in regard to the Spanish main. In 1692 he was a merchant in London, as is evident from a lease authorizing him and two others to construct the Hampstead water works. About this time he made proposals in regard to founding a bank of England, and a tract entitled "A Brief Account of the intended Bank of England" is supposed to have been written by him. He was one of the first directors of the institution, but resigned. He had long before conceived the project of founding "a free commonwealth in Darien," and after unsuccessful efforts in England it was finally sanctioned by a Scottish act of parliament in 1695 constituting the Darien company. (See DARIEN, COLONY OF.) After the failure of the expedition he returned to England and devised a new plan for the colony; but the unexpected death of King William, over whom he had great influence, destroyed all possibility of reviving the project. He was an able advocate of the union of England and Scotland, and when the treaty to that effect was passed, an indemnity was recommended to be given him on account of the losses he had suffered in the Darien expedition, and of his "carrying on other matters of a public nature, much to his country's service." But it was not till the reign of George I., and after a long struggle with the government, that the indemnity was paid. Paterson was in 1708 a member of parliament for Dumfriesshire. The last years of his life were spent in Westminster. He was an early and zealous advocate of free trade, and was a decided opponent of the schemes of John Law. His works have been collected under the title of "The Writings of William Paterson, with a Biographical Introduction" (2 vols. 8vo, 1858).—See Bannister's "William Paterson, the Merchant, Statesman, and Founder of the Bank of England, his Life and Trials" (Edinburgh, 1858); and "The Birthplace and Parentage of William Paterson," by William Pagan (1865).

PATKUL, Johann Reinhold, a Livonian patriot, born in a prison at Stockholm about 1660, executed at Kazimierz, near Posen, Oct. 10, 1707. He first served as a captain in the Swedish army. In 1689 he was one of a deputation of noblemen sent to Charles XI. to remonstrate against the encroachments of the royal officers upon the rights and privileges of Livonia. Having participated in other patriotic manifestations, Patkul, in connection with the marshal and members of the Livonian diet, was summoned to Stockholm. Procuring a safe-conduct, he obeyed the summons, but soon judged it necessary to flee to Courland; and a few weeks after his escape he was condemned to be beheaded as a rebel, his property was confiscated, and his writings were burned by the executioner. He retired to the canton of Vaud, Switzerland, where he engaged in scientific pursuits, and afterward visited France. In 1698, after the accession of Charles XII., he sued for pardon; but his petition being rejected, he entered the service of the elector Augustus of Saxony, king of Poland, who appointed him one of his privy council. He participated actively in the coalition between his new master, the king of Denmark, and the czar of Russia against Charles XII., and at different times endeavored to rouse Livonia against the Swedish rule. Dissatisfied with the overbearing manners of Flemming, the principal minister of Augustus II., and having moreover, during a mission to Russia, won the favor of Peter the Great, he accepted from the czar the rank of general and the office of Russian ambassador to Dresden. This roused the displeasure of Augustus, who caused him to be arrested in 1705. When afterward Augustus, defeated by Charles XII., was obliged to abdicate his Polish throne, one of the conditions of peace imposed upon him was the surrender of Patkul. Augustus gave secret orders that his prisoner should be suffered to escape, but they were not obeyed. By Charles's command, Patkul was taken to the convent of Kazimierz and condemned to death by a court martial. He was first broken on the wheel, and then, while still living, beheaded.

PATMORE, Coventry Kearsey Dighton, an English poet, born in Woodford, Essex, July 23, 1823. He published in 1844 a small volume of poems, and in 1853 "Tamerton Church Tower, and other Poems," neither of which attracted much attention. He is best known by his "Angel in the House," an attempt to invest the commonplace incidents of life with poetic interest; it is in four parts, entitled "The Betrothal," "The Espousal," "Faithful for Ever," and "The Victories of Love" (1854–'62). In 1862 he edited "A Garland of Poems for Children." From 1846 to 1868 he was an assistant librarian of the British museum.

PATMOS (now Patmo), an island of the group called the Sporades in the Grecian archipelago, about 20 m. S. of the S. W. extremity of Samos, and about 30 m. W. of the coast of Asia Minor; pop. about 4,000. It is an irregular mass of barren rock 28 m. in circumference, and in the time of the Roman emperors was used as a place of banishment. To this island St. John the apostle was exiled by Domitian, A. D. 95; and here, according to universal tradition, he wrote the Apocalypse, and perhaps his Gospel also. On the side of a hill a cavern is pointed out by the Greek monks, who have a monastery in the vicinity, as the exact spot where the evangelist received the revelation. The monastery, built by the Byzantine emperors in the 12th century, is inhabited by about 50 monks, subject to the patriarch of Constantinople. On the E. side of the island there is a small village and a good port. The island is subject to the Turks, but the inhabitants are all Greeks. They subsist by fishing and commerce, and by agricultural labor on the mainland or the more fertile islands, migrating for the purpose every summer.

PATNA. **I.** A division of Bengal, British India, comprising the districts of Patna, Gaya, Shahabad, and Sarun, S. of the Ganges, and Tirhoot and Chumparun, N. of that river; area, 23,732 sq. m.; pop. in 1872, 13,122,743, of whom more than half were agricultural laborers. The territory of the native state of Behar is comprised in this and the neighboring division of Bhaugulpore. **II.** A district in the above named division, extending from lat. 25° 3′ to 25° 38′ N., and lon. 84° 45′ to 86° 10′ E.; area, 2,101 sq. m.; pop. in 1872, 1,559,638. The Ganges flows along its N. frontier, and the river Sone forms the W. and N. W. boundary. The growth of the opium poppy is the most important branch of cultivation carried on in the district. Patna was ceded to the English, with Bengal, the rest of Behar, and a small part of Orissa, in 1765. It was the scene of some of the most memorable events in the great mutiny of 1857, every part of the district except the capital having been for a long time in the hands of the insurgents. The district is traversed by the East Indian railway. **III.** A city, capital of the district, on the right bank of the Ganges, in lat. 25° 33′ N., lon. 85° 11′ E., 285 m. N. W. of Calcutta; pop. about 300,000. The city proper, or fort, is of rectangular form, surrounded by a wall which extends about 1½ m. along the bank of the river, and ¾ m. inland. The suburbs are very extensive, and stretch 7½ m. along the Ganges. The principal thoroughfare, parallel to the river, is wide, though neither straight nor regular; and the other streets and lanes are narrow and crooked. Some of the houses are built of brick, and have flat roofs and balconies; but many of them are made of mud and covered with tiles and thatch. Patna is situated on the East Indian railway, and is an important centre of the opium trade, the government agency for Behar being located there. The town was permanently taken possession of by the British in 1764, after the defeat of the nawaub of Bengal under its walls. A monument is erected in the city to the memory of 200 British who were cruelly murdered by the nawaub a few months before his defeat.

PATON, Andrew Archibald, an English author, born in 1809, died in Ragusa, April 8, 1874. He early devoted himself to geographical and ethnological explorations and researches, and published "The Modern Syrians" (1843), "Servia" (1844), "The Highlands and Islands of the Adriatic" (1849), "The Goth and the Hun" (1850), and "The Bulgarian, the Turk, and the German" (1855), the last four collected under the title of "Researches on the Danube and the Adriatic" (2 vols., 1862). Among his other works are: "Mamelukes" (1851); "Melusina, a new Arabian Nights' Entertainment" (1861); and "Sketches of the Ugly Side of Human Nature" (1867).

PATON, Sir Joseph Noel, a British painter, born at Dunfermline, Scotland, in 1821. He studied at the royal academy in London, was elected associate member of the academy in 1846, academician in 1856, and queen's limner for Scotland in 1865. He was knighted in 1867. His "Spirit of Religion," a fresco (1845), and his oil paintings of "Christ bearing the Cross" and "Reconciliation of Oberon and Titania" (1847), commanded considerable prices, and his "Quarrel of Oberon and Titania" (1849) brought £700 for the Scottish national gallery. The best known of his numerous illustrations of the poets are "Dante composing the Story of Francesca da Rimini" (1852), "The Dead Lady" (1854), and six pictures illustrating the old border ballad, "The Dowie Dens of Yarrow" (1860). Among his many other productions are "Pursuit of Pleasure" (1855), "Home" (1856), "In Memoriam" (1856), and "Dawn: Luther at Erfurt" (1861). He has published "Poems by a Painter" and "Spindrift" (Edinburgh, 1867).

PATRAS (anc. *Patræ*), a fortified seaport town of Greece, in the N. W. part of the Morea, on the gulf of the same name, 107 m. W. N. W.

of Athens, capital of the nomarchy of Achaia and Elis; pop. in 1871, 19,641. It is situated partly on a spur of Mt. Voidhia, on which stood the ancient town, but principally on the level plain below it. The streets are broad and at right angles; the houses mostly of one story on account of earthquakes. There is a castle on the site of the ancient acropolis. Patras is the principal seat of the foreign trade in the Morea. For the protection of the harbor a mole has been constructed.—The ancient city was founded by the Ionians, from whom it was wrested by the Achæans under Patreus, from whom the city received its name. During the Peloponnesian war it alone of the Achæan towns embraced the side of the Athenians. In 419 B. C. Alcibiades persuaded the inhabitants to join the city and port by a long wall. It was a member of the Achæan league, and during the war between the Achæans and Romans it was reduced to insignificance. Augustus selected it as one of the two Roman colonies established on the W. coast of Greece. It was destroyed by an earthquake in the 6th century; subsequently it was a dukedom of the Byzantine empire; was sold to the Venetians in 1408; and was taken by the Turks in 1446. It was afterward taken and retaken several times by the Turks and Venetians. In 1716 it was captured by the Turks, in whose hands it remained until the Greek revolution. It was the first city to raise the standard of independence Feb. 12, 1821, and in the following April it was burned by the Turks. It was recovered by the Greeks, but during the war the castle was held by a Turkish garrison, which in 1828 capitulated to a French force. Since the revolution the progress of Patras has been very rapid, and its manufactures and trade have greatly increased. —The gulf of Patras lies between Ætolia and the N. W. coast of the Morea and between the gulf of Lepanto on the east and the Ionian sea on the west. Its length is 22 m., its greatest breadth 14 m. Its navigation is difficult, and during the winter months sometimes dangerous.

Patras.

PATRIARCH (Gr. πατριάρχης, chief of a race), a title applied to the fathers or heads of generations mentioned by the sacred writers from Adam to Jacob. After the destruction of Jerusalem it was the title of the chief religious rulers of the Jews in Asia; and in early Christian times it became the designation of the bishops of Rome, Constantinople, Alexandria, Antioch, and Jerusalem. Certain other bishops were likewise termed patriarchs in course of time, especially those of newly converted nations. In modern times patriarchs have jurisdiction over all the bishops and metropolitans or archbishops of their patriarchates, but their authority extends little beyond the right of convoking councils and exercising a general watchfulness over the conduct of their subordinate prelates. The patriarchs at present in communion with the see of Rome are those of Constantinople, Alexandria, Antioch, Jerusalem, the East Indies, Venice, and Lisbon, besides those of the Melchites, Maronites, and Syrians at Antioch, Armenians in Cilicia, and Nestorians (Chaldeans) nominally at Babylon. In the orthodox Greek church the title of patriarch is attached to the sees of Constantinople, Alexandria, Antioch, and Jerusalem; and various Christian sects of the East have patriarchs.

PATRICIANS (Lat. *patricii*, from *pater*, a father), the members and descendants, by blood or adoption, of the original houses of which the *populus Romanus* was wholly composed until the establishment of the plebeian order. They were at first divided into the tribes of Ramnenses, Titienses, and Luceres or Lucerenses, each tribe consisting of 10 *curiæ*, and each curia of 10 *gentes*, or in regard to representation and war of 10 *decuriæ*. The *gens*, all the members of which bore the same gentile name, sent its leader to the senate. Originally the two tribes of Ramnenses and Titienses enjoyed exclusive political privileges, but the Etruscan tribe of Luceres was admitted to the same rights by Tarquinius Priscus, and the number of senators, which before had been 200, was in consequence increased to 300. To distinguish the old senators from the new, the former were called *patres majorum gentium*, and the latter *patres minorum gentium*. At this period all the population who were not patricians were clients or slaves. After the formation of the plebeian order, the patrician became a real aristocracy, which held all civil and religious offices. No matter how poor he was, a patrician could not become a plebeian unless he voluntarily left his gens and curia, and gave up its obligations and privileges; and no matter how wealthy he was, a plebeian could not become a patrician except in accordance with the *lex curiata.* At the end of the republic the number of patrician families had diminished to about 50, and both Julius Cæsar and Augustus and the succeeding emperors found it necessary to raise plebeians to the patrician rank. The plebeians, in a struggle of centuries, had conquered all their political rights. The formation of the new aristocracy, founded upon wealth and upon the holding of the offices of consul, prætor, and curule ædile, rendered the old patrician families of still less account. During the empire the Roman citizens were divided into the two classes of *populus* and *patricii.* At the accession of Constantine the patrician families had almost entirely died out, and that monarch made it a personal title instead of a hereditary distinction. It was granted to all who had made themselves eminent by their services to the empire or the emperors. With the exception of the consuls, they constituted the highest rank in the state. Those members of the patrician body who were in actual service, as usually most of them were, went under the name of *patricii præsentales;* the others were dalled *patricii codicillares* or *honorarii.* This distinction was conferred by most emperors with much caution, but some granted it even to eunuchs. It was also conferred at times on foreign princes. The exarch of Ravenna was sometimes styled patrician. After the loss of Italy, the Romans conferred this title on their rulers and protectors. During the middle ages families entitled patrician sprang up in many of the cities. In Venice members of the great council and their descendants bore the title. After 1297 no person was created patrician, but all descendents of those who belonged to that body became members by right at the age of 25. In Rome, Genoa, and other cities of Italy, the title of patrician is still used.

PATRICK, a S. county of Virginia, bordering on North Carolina, and drained by the Dan, Smith's, and North and South Mayo rivers, all of which have their sources in the Blue Ridge, which forms its N. W. boundary; area about 500 sq. m.; pop. in 1870, 10,161, of whom 2,325 were colored. It has a mountainous surface, and is noted for its picturesque scenery; much of the soil is fertile, and iron ore is abundant. The chief productions in 1870 were 9,657 bushels of wheat, 12,984 of rye, 147,329 of Indian corn, 50,937 of oats, 17,166 of Irish and 8,205 of sweet potatoes, 85,545 lbs. of butter, 8,096 of wool, 37,211 of honey, and 323,886 of tobacco. There were 975 horses, 2,196 milch cows, 3,279 other cattle, 5,028 sheep, and 11,560 swine. Capital, Patrick Court House.

PATRICK (Lat. PATRICIUS), **Saint,** the apostle and patron saint of Ireland. The place of his birth is uncertain. O'Curry discovered in the British museum a manuscript tripartite life of the 6th century, which affirms that Patrick was born in 372 at Bonavens Taberniæ, thought by some to be the modern Boulogne. Others maintain that he was born near Kilpatrick in Scotland, in 373. He died in Down, Ulster, March 17, 493 or 495. The name of Patricius was bestowed on him in Rome by Pope Celestine, his original name having been Succath. At the age of 16 he was carried captive to Ireland by a band of marauders, but after six months escaped to Scotland. Carried off a second time, and again escaping, he resolved to become a missionary to the Irish, was ordained in Scotland, and after a long preparation was consecrated bishop. Having previously, according to some accounts, visited Gaul and perhaps Italy, he passed over to his chosen field of labor about 432, and preached the gospel with such extraordinary effect that, although not absolutely the first to introduce Christianity into that country, he has always received the credit of its general conversion. He baptized the kings of Dublin and Munster, and the seven sons of the king of Connaught, with the greater part of their subjects, and before his death had converted almost the whole island to the faith. St. Bernard testifies that he fixed his metropolitan see at Armagh, and it appears that he appointed several other bishops, with whom he held councils to settle the discipline of the church. He is said in his old age to have written his "Confession," but its authenticity is considered doubtful by many. It may be found in Sir James Ware's edition of the works of St. Patrick (8vo, London, 1658). The Roman Catholic church keeps his festival on March 17. Patrick devoted the lands bestowed on him to the foundation of churches, of cloisters for both sexes, and of numerous monastic schools, which flourished during the next three centuries. He was also zealous for the suppression of slavery, which was one of the great incentives to the piratical expeditions so frequent in his day.

PATRICK, Simon, an English author, born in Gainsborough, Lincolnshire, Sept. 8, 1626, died May 31, 1707. He was educated at Queen's college, Cambridge, where he became a fellow in 1648, and took orders in 1651. In 1658 he was presented with the living of Battersea, and from 1652 to 1704 he published more than 30 sermons and devotional treatises. In 1662 he became rector of St. Paul's, Covent Garden, in 1672 prebendary of Westminster, in 1679 dean of Peterborough, in 1689 bishop of Chichester, and in 1691 bishop of Ely. Besides his translation of Grotius *De Veritate,* he wrote a "Commentary and Paraphrase on the Old Testament" (10 vols. 4to, London, 1695–1710); it extends to Canticles, and was completed by Lowth and Whitby for the whole Bible. His autobiography was first printed in

Oxford in 1839. The first collected edition of his works was printed by the Oxford press in 9 vols. 8vo (1859), and a treatise on "The Appearing of Jesus Christ" was first printed from the original manuscript in 1863, at Cambridge.

PATRIPASSIANS (Lat. *pater*, father, and *passio*, suffering), the name given to those Christians of the 2d and 3d centuries who attributed the sufferings of the incarnate Son to the Father. This doctrine was only one of the aspects of Noëtianism (see Noëtians), its earliest advocates in Asia Minor and Italy being Praxeas and Noëtus. It originated among a class of men who were anxious, on the one hand, to uphold the divinity of the incarnate Son of God, and on the other, to guard Christian doctrine against the imputation of polytheism. This they did by denying the personality of the Son as distinct from the Father. The Father, they taught, united himself with the man Jesus Christ, and suffered and died with him; whence it followed that the same divine person was called indifferently sometimes the Father and sometimes the Son. The Patripassian doctrines were refuted by Tertullian and by Hippolytus; but no full exposition of them remains. These sectarians were afterward confounded with the Sabellians, and involved in their condemnation.

PATROCLUS, a Greek legendary hero, the friend of Achilles, and son of Menœtius of Opus. While a boy he accidentally killed Clysonymus, and in consequence was sent to the court of his relative Peleus, and brought up with Achilles. He took part in the siege of Troy until his friend retired from action, when Patroclus also withdrew; but the affairs of the Greeks becoming desperate, he obtained from Achilles his armor and his troops, drove back the Trojans, and saved the ships. During the conflict he was struck senseless by Apollo, and was killed by Euphorbus and Hector, the latter taking possession of the armor. The Greeks secured his body and buried it under a mound, which was afterward opened to receive the dead body of Achilles, who had avenged his friend by the death of Hector.

PATRON (Lat. *patronus*, from *pater*, a father), an appellation given by the Romans to a patrician who had plebeians, called clients (see Client), under his protection, or to a master who had freed his slaves. When a slave was manumitted, he himself was called *libertus* or freedman, and his master *patronus*, and between them existed certain duties and privileges, which however seem to have been more fixed by custom than by law. The patron took the freedman under his protection, and the freedman owed to his former master respect and gratitude, and was bound to support both him and his children in cases of necessity. By a special agreement the *libertus* after he was freed took an oath to make an offering to the patron of gifts and services, the latter being of two kinds, services of respect and services of labor. The former ended with the death of the patron, but the latter were due also to his heirs. The patron was not entitled to any services that were either dangerous or disgraceful; and by the *lex Julia et Papia Poppæa* freedmen, with a few exceptions, were discharged from all requirements as to gifts and services, if they were the parents of two children who were in their possession, or were the parents of one child five years old. The most important relation existing between the patron and freedman was the right of the former in certain cases to become the heir of the whole or a portion of the property of the latter. By the laws of the twelve tables, if a freedman died intestate without heirs of his own, the patron became his heir, as he was supposed to stand in the relation of an *agnatus*. By the *lex Papia*, when a freedman left property valued as high as 100,000 sesterces, some of it went to the patron whether a will had been made or not. If there were three children, however, the patron had no share. These rights of a patron extended to his direct but never to his collateral heirs, and the privileges of the *liberti* in regard to the succession of property extended only to those who were Roman citizens and not to the Latin freedmen. The latter "lost their life and their liberty at the same time," and their property passed into the hands of those who had manumitted them. In many other points the succession to their property differed from the succession to that of the Roman freedmen. Justinian gave to the Latin freedmen the same privileges as were possessed by the Romans. If a freedman was guilty of ingratitude, his patron might punish him summarily, and in later times he had the right to relegate him some distance from Rome. In the time of Nero an effort to pass a decree enabling a patron to reduce his freedman again to slavery failed, but afterward it was successful. The patron lost his rights if he neglected to support his freedman in a case of necessity. The *libertus* assumed on his manumission the gentile name of his patron.—In the canon law, a patron is a man who has the right of disposing of a benefice, from the fact that it was founded or endowed by him or by those to whose rights he has succeeded. This right is said to have sprung up about the close of the 4th century, and was probably intended as an inducement to the wealthy to found churches with the privilege of naming the person who should officiate. In the Roman Catholic church, a patron is a saint under whose protection a person places himself, often from bearing the same name, or who holds that relation to a whole nation or a community; or a saint to whom a particular church or order is dedicated.

PATTESON, John Coleridge, an English missionary bishop, born in London, April 1, 1827, killed by Melanesians near Santa Cruz, Sept. 20, 1871. He was educated at Balliol college, Oxford, was a fellow of Merton in 1850, was curate of Alfington in 1852, accompanied Bishop

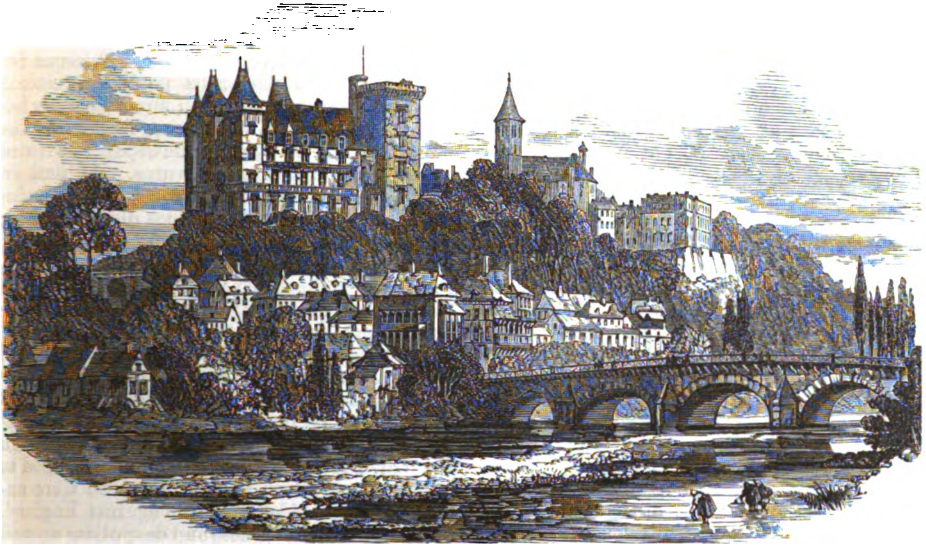
Selwyn in 1854 to New Zealand, and labored there and in neighboring islands as a missionary till 1861, when he was consecrated at Auckland as bishop of the Melanesian islands. He devoted the rest of his life to cruising about among the islands of his diocese, laboring for the improvement of the natives and for the suppression of the kidnapping carried on to supply Queensland and other colonies with laborers. In attempting to land at Santa Cruz, his boat was fired upon by the natives, he was killed, and his chaplain Mr. Atkin died from wounds a few days afterward. It is supposed that the natives mistook the missionary ship for a kidnapping vessel.—See "Life of John Coleridge Patteson," by Charlotte Mary Yonge (2 vols. 12mo, London, 1874), and "The Story of a Fellow Soldier," by Francis Awdry (1875).

PATTI. I. Adelina Maria Clorinda, an operatic singer, born in Madrid, April 9, 1843. Both her father and mother were professional singers, and from birth she was surrounded with musical influences, receiving much of her instruction in the art from Barili, her half brother, and Maurice Strakosch, husband of her elder sister Amelia, who was also distinguished as a singer. In 1844 the Patti family removed to New York, where Adelina sang in concerts when she was eight years old, and on Nov. 24, 1859, made her début as prima donna at the academy of music, in the character of Lucia di Lammermoor. Her success was immediate, and her brilliant future correctly predicted. On May 14, 1861, she made her first appearance in London in Bellini's *Sonnambula;* and on Nov. 16, 1862, she appeared in the same opera at Paris. Her success was no less in Europe than in America, and her engagements at London and Paris were followed by others at the principal capitals, where, especially in Russia, her popularity has been almost unrivalled. Besides a voice of exceptional beauty, range, and flexibility, she possesses rare powers as an actress. Though too small of stature adequately to personate the great characters of the highest style of tragic opera, her preëminence in parts requiring pathos and sentiment, such as Donizetti's Lucia and Gounod's Marguerite, or archness and coquetry, such as Mozart's Zerlina or Rossini's Rosina, is indisputable. On July 29, 1868, she was married in London to the marquis de Caux, a French nobleman. **II. Carlotta,** sister of the preceding, born in Florence in 1840. She possesses a soprano voice extending to G sharp in alto, and her facility of vocalization is as remarkable as her range of voice. Owing to a slight lameness, she has confined herself almost entirely to concert singing, though she has occasionally appeared in opera, in such parts as that of the Queen of Night in Mozart's "Magic Flute," with great success.

PATTISON, Robert Everett, an American clergyman, born in Benson, Vt., Aug. 19, 1800, died in St. Louis, Mo., Nov. 21, 1874. He graduated at Amherst college in 1826, was appointed a tutor in Columbian college, D. C., was ordained in 1829, and in 1830 became pastor of the first Baptist church in Providence, R. I. From this post he was called to a professorship in Waterville college, Maine, of which he was president from 1836 to 1840. He then became pastor of the second Baptist church of St. Louis, Mo., and in 1841 returned to his pastoral charge at Providence. In 1843 he was elected one of the corresponding secretaries of the Baptist board of foreign missions. He was president and professor of Christian theology in the western Baptist theological institute, at Covington, Ky., from 1845 to 1848, when he was appointed to a similar professorship in the Newton theological seminary, Mass., from which he was again called to the presidency of Waterville college in 1853. In 1858 he resigned and took charge of the Oread female institute, at Worcester, Mass. He was professor of systematic theology in Shurtleff college, Alton, Ill., from 1864 to 1870, when he was called to a professorship in the Baptist theological seminary of Chicago, which he resigned on account of ill health in 1874. For one year he was acting president of the university of Chicago. He published a "Commentary, Explanatory, Doctrinal, and Practical, on the Epistle to the Ephesians" (Boston, 1859).

PATUXENT, a river of Maryland, rising about 20 m. from the city of Frederick, and, after a S. E. course of about 40 m. and a nearly S. course of 50 m., discharging itself through an estuary 2 or 3 m. wide into Chesapeake bay. It forms the dividing line between Montgomery, Prince George's, Charles, and St. Mary's counties on the south and west, and Howard, Anne Arundel, and Calvert counties on the north and east. Small vessels can ascend it 40 m. to Nottingham.

PAU, a town of France, capital of the department of Basses-Pyrénées, on the right bank of the Gave de Pau, 410 m. S. by W. of Paris; pop. in 1872, 24,800. It is delightfully situated on a precipitous height, regularly laid out, and well built. The charm of the scenery and the mild and healthful climate attract to Pau many visitors, especially in winter; and there are three Protestant Episcopal churches and a Scotch Presbyterian church. Linen cloths, celebrated as *toiles de Béarn*, and fine table cloths, tapestry carpets, and cutlery are manufactured; and the place is noted for its Jurançon wine.—Pau was founded in the 11th century; a viscount of Béarn built a strong castle on the top of a hill, and having marked the limits of the ground with stakes or *paus*, the town took the appellation. In the 14th century the castle was rebuilt by Gaston Phœbus, count of Foix, and the place became the chief town of Béarn. Near the place Royale in the centre of the town, with a statue of Henry IV., is a fine promenade, and a park is formed by a natural terrace along the right bank of the Gave, well wooded and shaded, and connected through a square planted with trees with the castle. The latter is the most conspicuous edifice of Pau, and is remarkable for great historic associations. It was the birthplace of Henry IV., and his cradle and other relics are preserved in it. The castle was sacked by the revolutionists in 1793, and restored under the reign of Louis Philippe, Charles XIV. of Sweden (Bernadotte), a native of Pau, giving magnificent presents for the apartment leading to the chapel.



Castle of Pau.

PAUL, the name of five popes, of whom the most important are the following. **I. Paul III.** (Alessandro Farnese), born at Canino, Feb. 28, 1468, died in Rome, Nov. 10, 1549. Having completed his studies in Florence, he filled several important offices, was made cardinal in September, 1493, bishop of Parma by Julius II., and bishop of Frascati by Leo X. He was elected pope on Oct. 13, 1534. In 1535 he excommunicated Henry VIII., citing him to appear in Rome within 90 days; and in 1538 he confirmed the excommunication. He summoned, June 2, 1536, a general council to meet at Mantua, but transferred it successively to Vicenza and Trent, where the first session was held in December, 1545. He made an abortive league with the emperor and the republic of Venice against the Turks, and induced Francis I. and Charles V. to conclude a truce for ten years at Nice (1538), which however was not observed. He established the inquisition at Naples, approved the society of Jesus, sent a contingent of 12,000 foot and 1,000 horse to join the emperor's forces in Germany against the Protestants, and opposed the religious pacification called the *Interim* granted by Charles V. in 1547. He exerted himself zealously to subdue the turbulent feudatories of the Papal States, and expelled the powerful Colonna family from Rome. Before becoming a priest he had a son and a daughter, the former of whom was created duke of Parma and Piacenza. **II. Paul IV.** (Giovanni Pietro Caraffa), born at Capriglia, kingdom of Naples, June 28, 1476, died in Rome, Aug. 18, 1559. He was proficient in the Scriptures and the oriental languages, became archbishop of Chieti in 1505, was sent to England by Julius II. to collect the "Peter's pence," founded with St. Cajetan the order of Theatines in 1524, and was created cardinal on Dec. 22, 1536. He was appointed archbishop of Naples on Dec. 15, 1549, and on May 23, 1555, was elected pope in spite of the opposition of Spain. He displayed an energy in his administration which had not been expected from his advanced age and previous studious habits. He concluded an alliance with Henry II. of France against the emperor Charles V. (December, 1555), and afterward against Philip II., in consequence of which his dominions were invaded by the duke of Alva, and the Spanish troops advanced almost to the gates of Rome. A peace was concluded in 1557. The emperor Ferdinand I. having accepted the throne without consulting the holy see, the pope dismissed the imperial ambassador, and Ferdinand did not come to Rome to be crowned, an example which was imitated by all the succeeding emperors. Paul IV. was determined in his hostility to the Protestants, against whom he issued a bull in 1559, and cooperated earnestly with Queen Mary in her attempts to restore Catholicism in England. He introduced the inquisition into his dominions, and labored assiduously for the reformation of the clergy. He raised his nephews to the highest honors in the state, and made one of them a cardinal, though he had been a soldier and a libertine; but hearing that they abused their power, he banished them from Rome in 1559. He was hated by his subjects, who rose in tumult on the news of his death, and threw down his statue, crying: "Death to the Caraffas." **III. Paul V.** (CAMILLO BORGHESE), born in Rome, Sept. 17, 1552, died there, Jan. 28, 1621. He succeeded Leo XI. in 1605, and soon after his accession was involved in a dispute with the republic of Venice respecting the foundation of religious houses, the alienation of charitable bequests, and the trial of ecclesiastics by lay tribunals. He excommunicated the doge and the senate, and laid the republic under an interdict, which the senate forbade to be published, and which only the Jesuits, Theatines, and Capuchins observed. These three orders were consequently banished. The dispute was settled through the mediation of Henry IV. in 1607. Paul devoted himself with great zeal to reforming the administration of his temporal government, embellishing Rome, and restoring ancient monuments. He sent missionaries to the East, and received embassies from Japan, from several princes of India, and from Congo.

PAUL, Father. See SARPI, PAOLO.

PAUL I., Petrovitch, emperor of Russia, born Oct. 12, 1754, assassinated March 23, 1801. He was the son of Peter III. and Catharine II., and when, after the assassination of Peter, Catharine assumed the reins of government (1762), she furnished Paul with good instructors, but kept him in ignorance of public affairs. As he grew up, her personal dislike of him became so great that she compelled him to live at a distance from the capital, surrounded him with spies, and would have disinherited him if she could. Such treatment made him morose, revengeful, craven toward his mother, yet wilful and tyrannical toward inferiors. At the age of 19 he was married by order of his mother to a princess of Hesse-Darmstadt, and after her death in 1776 to a princess of Würtemberg. His second wife bore him four sons (Alexander, Constantine, Nicholas, and Michael) and five daughters. In 1780 Paul travelled through Poland, Germany, Italy, France, and Holland. On his return he continued to live in retirement, 30 m. from St. Petersburg, while his children were brought up at court under the direction of Catharine. Afterward he took part in the war against Sweden, but his mother deprived him of every opportunity of becoming familiar with the duties of his position. Catharine died Nov. 17, 1796, and Paul ascended the throne. One of his first acts was to cause funeral honors to be paid to his murdered father, and he ordered the remains of his mother's former favorite, Prince Potemkin, to be disinterred and thrown into a ditch. To undo whatever Catharine had done seemed to be his guiding principle. He disbanded her armies, declared peace with Persia, disapproved of her policy toward Poland, liberated Kosciuszko and the other Polish prisoners, decreed that the female line should henceforth be excluded from succession, and invited his eldest son to assist in the administration. But his defective education, egotism, and nervous and fitful temper made him an execrable tyrant. His most puerile whims and caprices were raised to the dignity of laws, and a well organized secret police was constantly active in discovering victims for his wrath. His numerous petty oppressions exasperated the people even more than his hatred of liberal ideas, his decrees forbidding the importation of all books or newspapers printed in French, and similar measures. At first he became a party to the coalition against revolutionary France, and his armies obtained some successes in Italy, Switzerland, and Holland; but having afterward suffered severe reverses, Paul became disgusted with his allies, expelled the French refugees from Russia, and endeavored to get up a coalition against Great Britain. In this he succeeded so far that Denmark, Sweden, and Prussia joined him in a treaty of armed neutrality. But his hatred of Great Britain had become so violent that he was far from being satisfied with this success. Through the "St. Petersburg Journal" he challenged to personal combat all those kings who were unwilling to take sides with him against England. At last his capriciousness and despotism seemed to border on insanity. A conspiracy was formed by a number of noblemen, among whom Counts Pahlen and Zuboff, Generals Benningsen and Uvaroff, and Lieut. Col. Tatisheff were the most conspicuous. To his son Alexander they represented that they had no other object than to compel the emperor, on the ground of mental incapacity, to abdicate the throne. They forced their way into Paul's chamber late at night, and presented for his signature a letter of abdication. He refused to sign, whereupon Zuboff knocked him down and kneeled upon him, and, the other conspirators assisting, the emperor was murdered within hearing of his eldest son and successor. All classes in St. Petersburg received the news of his death with great rejoicing.

PAUL, Regular Clerks of St. See BARNABITES.

PAUL, Saint, the first Christian missionary who extended his labors beyond the limits of the Jewish people, and the first Christian teacher who maintained the equality of Jews and gentiles under the new dispensation, and admitted the latter to the full participation of Christian privileges without the exaction of the ceremonial law. Paul is ranked by the Christian church with the twelve apostles, and claims that rank for himself in his epistles. Our knowledge of his history is derived from the Acts of the Apostles and incidental notices in his letters to the churches. Many attempts have been made to arrange these materials in a systematic biography, of which the most comprehensive is the "Life and Epistles of St. Paul," by Conybeare and Howson (London, 1850-'52). For the critical student the works of Wieseler and Baur are the most important. Paul was a Grecian or Hellenistic

Jew (that is, a Jew born beyond the limits of Palestine), but, until his conversion, a rigid Hebrew of the sect of the Pharisees, by parentage and training as well as by personal conviction. His original and Jewish name Saul appears to have been dropped and that of Paul adopted soon after his accession to the Christian ministry; for what cause it is not possible to say, nor whether the name Paul had ever been used as one of his appellations before his conversion. He was born in Tarsus, the metropolis of Cilicia. The precise date of his birth is unknown, but is proximately determined by the circumstance that Paul is spoken of as a young man at the time of the martyrdom of Stephen. The best chronologists place that event about A. D. 38. Accordingly, Paul may be conjectured to have been born about A. D. 10. His family enjoyed the right of Roman citizenship, either as *libertini* (slaves honorably manumitted), or in consequence of important services rendered to the state. The traces of philosophic thought in his epistles, and his evident familiarity with the Greek poets, show that he possessed gentile as well as Jewish learning. According to rabbinical law and custom, which required every male Jew to be taught some manual art, he learned the trade of a tent maker, to the practice of which he was afterward indebted in part for his support. (Acts xviii. 3, xx. 34; 1 Cor. iv. 12.) His knowledge of the law and the prophets and other essentials of a Jewish education was obtained at Jerusalem under Gamaliel, the most learned rabbi of his time. Paul's first appearance in history connects itself with the martyrdom of Stephen, to which he was a party, being at that time a student at Jerusalem, and heartily devoted to the Pharisaic interest in that city. From this time he became a zealous persecutor of the Christian church, volunteering his services to the sanhedrim for that purpose, and holding a commission from that body to ferret out, both at Jerusalem and in "strange cities," and bring to trial the confessors of the new faith. While bound to Damascus on one of these errands, he was converted by a vision, which changed the whole course of his life, impelling him to become the apostle of the faith he had persecuted. The three accounts of the matter in the Acts (ix. 7, xxii. 9, and xxvi. 14) differ in the manner of stating what was then observed by himself and his companions, but all agree in their representation of the impression made on Paul himself of a voice addressing him in the name of Christ and bidding him forbear the persecution of his church. Struck with temporary blindness by the vision, he was brought to Damascus, where after three days' sojourn he recovered his sight at the hands of a disciple named Ananias and received Christian baptism. The next three years were spent in Arabia and Damascus, after which the apostle made a brief visit to Peter at Jerusalem, and then returned to his native city. Meanwhile a new centre of Christian influence had established itself at Antioch, and thither Paul went at the solicitation of Barnabas, who had come to Tarsus to secure his coöperation. Here he remained for a year or more, expounding and propagating the new faith. A famine which visited Judea in 45 induced the church at Antioch to send pecuniary aid to the Christians at Jerusalem, and Paul and Barnabas were deputed to convey the money. (Acts xi. 29, 30.) Having accomplished this mission, he returned to Antioch, and made that city his headquarters and the starting point of his missionary tours in Asia Minor and Europe. Three distinct journeys from this point are recorded. The first, in which Paul was accompanied by Barnabas, and for a portion of the way by John Mark, embraced the island of Cyprus from east to west, and three of the southerly provinces of Asia Minor, viz., Pamphylia, Pisidia, and Lycaonia. In the principal cities of these countries the missionaries established Christian churches after the model of that at Jerusalem. Some time after his return to Antioch, where Paul now resumed his home ministry, the attempt was made by Judaizing Christians, sent from Jerusalem for that purpose, to impose the Mosaic ritual on the gentile converts. The movement was strenuously resisted by the leaders of the Antioch church, and Paul and Barnabas were sent to Jerusalem to debate and arrange this difficulty with the apostles and elders in that city. This first Christian council is assigned by different authorities to dates ranging from the year 47 to the year 55. We incline with Wieseler to place it at 50. The two delegates, after a satisfactory adjustment, returned to Antioch accompanied by two messengers from Jerusalem. With one of the latter, Sylvanus or Silas, Paul soon after undertook his second missionary tour, having previously separated from Barnabas in consequence of a dispute between them relative to John Mark, whom Barnabas desired to take with them, but whom Paul rejected on account of his desertion of them at Perga in the first expedition. The missionaries visited Cilicia and the regions already traversed by Paul, and the churches founded by him in Pamphylia and Lycaonia. At Lystra they were joined at Paul's solicitation by Timothy. They extended their travels through the central provinces of Asia Minor, Phrygia and Galatia, then to Mysia, and so to the western coast. At Troas Paul resolved, in consequence of a dream which he interpreted as a call from God, to cross over to Europe. Accordingly the company, of which Luke, it is supposed from the use of the first person plural which occurs here for the first time in the narrative, was one, took ship at Troas, and after a short run landed at Neapolis on the Macedonian coast. They proceeded thence to Philippi, where the Christians came into collision with a gentile party who trafficked in divination, and who inflamed the minds of the people against Paul and Silas. The apostle and his friend were publicly scourged and thrust into prison, but honorably released the next day, when the jailer, whom Paul had baptized, represented to the magistrates that they were Roman citizens. In Thessalonica, where they made many converts among the Hellenists, they met with a strong opposition on the part of the stricter Jews, who followed them to Berea, where also success had attended their efforts. The "brethren," thinking that Paul's life was endangered, sent him away in the charge of friends, who brought him to Athens. Here he held public disputations with philosophers of the leading schools, and at their invitation gave a public exposition of his doctrine in the areopagus, pronouncing on this occasion the remarkable speech on the nature of Deity, the most striking and important of all the speeches recorded of him. From Athens he went to Corinth, then capital of the Roman province of Achaia, where he enjoyed the hospitality of a Jewish family recently banished from Rome under the edict of Claudius forbidding the residence of Jews in that city. He practised here his craft of tent maker, which was also that of his host (Aquila), and so relieved him of the burden of his support. He was soon joined by Silas and Timothy, and with their assistance, urged by a vision foretelling success, he ministered for nearly two years to the people of Corinth; and having established a flourishing church, to which two of the epistles in our collection are addressed, he returned to Antioch, touching at Ephesus and visiting Jerusalem by the way. After an interval of rest at Antioch, in the autumn, it is supposed, of the year 54, Paul entered on the third and last of his missionary journeys. Passing through various provinces of Asia Minor, he arrived at Ephesus, where he remained for three years, laboring with marked success, inducing, among other fruits of his ministry, the magicians to abandon their practice and to burn their books (a pecuniary sacrifice of 50,000 drachmas, equivalent to $8,000 or $9,000). A hostile encounter with the silversmiths of that city, who traded in models of the temple of Diana, and whose business was endangered by Paul's preaching, hastened his departure from Ephesus. He proceeded to Macedonia, and thence to Greece; then returning to Macedonia, he crossed over to Troas, and from there, by way of Assos and the islands of Chios and Samos, he went to Miletus, accompanied by Timothy, Luke, and other disciples. At Miletus he received a deputation of the elders of the church at Ephesus, whom he had invited to meet him, and to whom he communicated his parting instructions, bidding them a final and affectionate farewell. He then embarked with his company for Rhodes and Tyre on his way to Palestine, whither he went, as he says, "bound in the spirit;" his friends in every city where he stopped on the route endeavoring to dissuade him; "the Holy Spirit," in every city, "witnessing that bonds and afflictions" awaited him; his own instinct in spite of prophecies and entreaties urging him on. The party arrived at Jerusalem at the feast of Pentecost in the year 58; they presented themselves before James and the other elders of the church, and Paul reported the many-sided success of a mission embracing a considerable portion of the Roman empire in its wide endeavor. The Christian party at Jerusalem, under the influence of the Jewish capital, and anxious to conciliate their countrymen, so far from renouncing the law of Moses, were especially scrupulous in their observance of it. Aware that Paul had rendered himself obnoxious to Judaizing Christians by his liberal views in relation to this matter, the elders persuaded him by an act of public conformity to humor their prejudices and disarm their hostility. At their suggestion he united with a party of four who were then discharging a Nazaritic vow, and was seen with them in the temple fulfilling the ritual purification prescribed by Levitical law. But the measure which was to have secured him against the zeal of his opponents only served to betray him into their hands. Seen in the temple, he was seized on a charge of plotting against the Mosaic religion, and accused of bringing gentiles into the sacred courts. The Roman guard rescued him, and on the discovery of a conspiracy against his life, he was sent to Cæsarea to Felix, proconsul of the province of Judea. Felix, though seemingly satisfied of his innocence, for the sake of conciliating the Jews detained him a prisoner at Cæsarea. After the expiration of two years Felix was succeeded by Festus, and Paul was then offered the opportunity of a trial before the national council at Jerusalem, which he declined, aware of the impossibility of obtaining a fair hearing from that tribunal. He appealed by right of his Roman citizenship to the government at Rome, and to Rome accordingly he was sent. He arrived there in the spring of 61, after the long and perilous voyage and shipwreck described in the Acts (xxvii.). While there he was permitted as a special favor to reside in a hired lodging. Here he remained two years, and, though under constant military guard, was allowed free intercourse with his countrymen and others who chose to visit him, and was thus enabled to prosecute his missionary labors with success. Members of the imperial household were among his converts. (Philipp. iv. 22.) Here the history leaves him. The supposition of Baur, Wieseler, and many others is that he never recovered his liberty, but remained a prisoner at Rome until he was put to death, a martyr to his faith; but there is a widely accepted tradition that he was tried and acquitted, that he left Rome, made other missionary tours, was once more arrested, brought to Rome, tried, condemned, and executed. It is even asserted that he passed two years in Spain, returning to Rome about 64, and suffering death by decapitation in 65, or according to some authorities Feb. 22, 68. The attentive reader of the New Testament will notice indications of the opposition, jealousy, and even persecution which Paul encountered at the hands of his fellow Christians of the Judaistic type. This circumstance should be taken into the account in estimating the worth and force of a character which in moral heroism has no superior, perhaps no equal, in the world's annals.—Of the 21 epistles embraced in the canon of the New Testament, 14 are popularly ascribed to Paul and assigned to him in the current versions. Of these, the Epistle to the Hebrews is pronounced by many critics to be the work of some other hand. The genuineness of the pastoral epistles (the two to Timothy and the one to Titus), and of Colossians and Ephesians, has also been called in question; and Baur even doubts the authorship of Philippians, Philemon, and the two Thessalonians, allowing as indisputably genuine only Galatians, Romans, and the two Corinthians. In this extravagant judgment few critics will agree with him. Renan (*Saint Paul*, Paris, 1869) doubts the authenticity of the Epistle to the Ephesians, and rejects the two to Timothy and the one to Titus. It is impossible to determine the chronological order of the epistles. The two to the Thessalonians are placed first by most of the critics who admit their genuineness, and after them the Epistle to the Galatians. Then follow, in Wieseler's arrangement, 1 Timothy, 1 Corinthians, Titus, 2 Corinthians, Romans, Philemon, Colossians, Ephesians, Philippians, and 2 Timothy.—See, besides the works cited above, "The Life and Epistles of St. Paul," by Thomas Lewin (2 vols. 4to, London, 1874).

PAUL, Vincent de, a saint of the Roman Catholic church and founder of the congregation of sisters of charity, born at Pouy, Gascony, in 1576, died at St. Lazare, near Paris, Sept. 27, 1660. His father was a peasant, who put him when 12 years old to learn Latin of the Franciscan friars at Acqs (now Dax). He afterward became tutor in the family of a lawyer, who sent him in 1596 to the university of Toulouse, where he passed seven years, was ordained priest in 1600, and received in 1604 the degree of bachelor of divinity. In 1605, on a voyage from Marseilles to Narbonne, he was captured by Turkish pirates, carried to Tunis, and became finally the slave of a renegade from Nice. Through the influence of one of his wives, who had heard Vincent singing sacred songs at his labor, this man resolved to return to Christianity, and in June, 1607, fled from the country with his slave and reached France in a skiff. Vincent spent the succeeding year in Rome, whence Cardinal d'Ossat sent him to Paris on a secret errand to King Henry IV., and subsequently procured his nomination to the abbey of St. Léonard de Chaume in the diocese of Rochelle. About the same time he was appointed chaplain to the ex-queen Margaret of Valois. In 1613 he became tutor to the sons of Emmanuel de Gondi, count de Joigny, one of whom was afterward Cardinal de Retz. He also preached to the peasantry of his patron's estates, particularly on the necessity of confession; and the success of this work induced the countess to offer 16,000 livres to any religious community which should undertake to perform it among her tenantry every five years. Being appointed chaplain to the galleys at Marseilles in 1622, Vincent devoted himself to the welfare of the convicts, and, after sensibly ameliorating their mental and bodily condition, went to Paris to extend his reforms to the prisons in which they were confined while waiting to be sent to the seaports. He fitted up a separate building for them, and when absent himself caused two priests who had joined in his charitable enterprise to live in the prison. He next appears at Mâcon, as the apostle of the multitudes of thieves and beggars for whom that city was then notorious. From 1622 till his death he was director of the nuns of the order of the Visitation in Paris. In 1624 the countess de Joigny revived the project of establishing stated missions among the poor, and with the coöperation of her husband and the archbishop of Paris proposed to Vincent to undertake the establishment of a new order, which she promised to endow with 40,000 livres. Accordingly in 1625 Vincent, accompanied by two other priests, took up his residence in the *collège des bons enfants*, which had been given for the purpose by the archbishop, and founded the congregation of "Priests of the Mission," commonly called Lazarists from the priory of St. Lazarus which they acquired soon afterward. The associates received royal letters patent in May, 1627, at which time they had increased to five, and were erected into a congregation by Pope Urban VIII. in 1632. (See LAZARISTS.) Vincent devoted himself also to the spiritual improvement of the clergy. He established religious exercises for candidates for orders, to which the archbishop of Paris afterward obliged all his ecclesiastics to apply themselves for ten days before ordination; he threw open his house to all who wished to spend a few days in prayer and meditation; and every week he held spiritual conferences, to which the clergy resorted in great numbers. With the assistance of Cardinal Richelieu, who used to consult him in making ecclesiastical appointments, he opened in 1642 an institution in which young priests or candidates for the priesthood might fit themselves for the labors of the ministry by two or three years spent in study and pious exercises. The result of these efforts answered his greatest expectations. Wherever he preached it had been his custom to establish "confraternities of charity," composed of women who took upon themselves to search out and relieve the distressed, but without forming themselves into a regular order. In 1633 he determined to create a sisterhood which should pursue the same objects under a sufficiently conventual organization to insure the permanence and most beneficial working of the enterprise; and accordingly he placed four young women who had volunteered their services under the charge of Mme. Le Gras, who had been several years employed under his direction in labors for the poor. Such was the origin of the "Sisters of Charity." Their rule was drawn up by degrees in the course of some years, and Vincent lived to see 28 houses of the order established in Paris, besides others in various parts of Europe. The reformation of the hospitals, the establishment of an asylum for foundlings, the instruction of idiots at his priory of St. Lazarus, and continual labors among the convicts, are the next events which we have to record in his history. During the famine which depopulated Lorraine in 1638–'9 he collected and distributed upward of 2,000,000 livres among the sufferers. He attended Louis XIII. in his last illness, and was appointed by Anne of Austria one of the four members of the "council of conscience" to whom was committed the distribution of ecclesiastical preferments. In the wars of the Fronde he incurred the groundless suspicion of being a favorer of Mazarin, and his convent of St. Lazarus was sacked by a mob. His last labors were the foundation of an asylum for aged artisans of both sexes, and a hospital for all the poor of Paris, which was opened in 1657, a royal edict obliging every beggar in the metropolis either to enter this institution or to work for his living. Between 4,000 and 5,000 chose the former alternative. Vincent was beatified by Benedict XIII. in 1729, and canonized by Clement XII. in 1737.—See Maynard, *Saint Vincent de Paul* (4 vols., Paris, 1860).

PAUL OF SAMOSATA, a heresiarch of the 3d century. He became patriarch of Antioch in 260, and by extortion and bribery acquired great wealth. He affected extraordinary pomp, caused the hymns of the church to be abolished and others sung in praise of himself, and surrounded himself with young and beautiful women who attended him wherever he went. In defiance of the ecclesiastical canons he held the office of *ducenarius*, a sort of procuratorship under the emperor. He was an especial favorite of Zenobia, the queen of Palmyra, who called him to her court, admired his eloquence, and disputed with him on religion. He taught that there is only one God, who is denominated the Father; that the Word or Wisdom of God is not a substance or person, but is in the divine mind as reason in men; that Christ was a mere man who acquired this Word or Wisdom of God, becoming by it both God and the Son of God, though both in an improper sense, and gradually acquiring his knowledge and virtues; and that the divine Word withdrew from him when he suffered. His opinions were condemned in a council held about 264, but he was allowed to retain his see on promise of retracting them. Failing to keep his word, he was again condemned and deposed at the council of Antioch in 269. The favor of Zenobia enabled him to defy this sentence until 273, when she was conquered by the emperor Aurelian. The whole matter was now referred to the see of Rome, and Paul, expelled from his church, passed the rest of his life in obscurity. He had a few followers, who called themselves Paulianists. They disappear from history about the 5th century.

PAULA, St. Francis of. See Francis of Paula.

PAULCON. See Constantin Faulcon.

PAULDING. I. A N. W. county of Georgia, drained by branches of the Chattahoochee, Tallapoosa, and Etowah rivers; area, about 300 sq. m.; pop. in 1870, 7,639, of whom 556 were colored. Its surface is uneven and traversed by elevated ridges; the soil in the valleys is fertile. The productions in 1870 were 29,779 bushels of wheat, 153,132 of Indian corn, 12,887 of oats, 12,974 of sweet potatoes, 57,995 lbs. of butter, and 1,322 bales of cotton. There were 548 horses, 1,378 milch cows, 2,034 other cattle, 2,882 sheep, and 8,990 swine. Capital, Dallas. II. A N. W. county of Ohio, bordering on Indiana, drained by the Maumee and Auglaize rivers; area, 432 sq. m.; pop. in 1870, 8,544. Its surface is level, covered with forests, and the soil fertile. It is intersected by the Wabash and Erie and the Miami Extension canals, and the Toledo, Wabash, and Western railroad. The chief productions in 1870 were 56,555 bushels of wheat, 55,499 of Indian corn, 23,938 of oats, 20,002 of potatoes, 135,131 lbs. of butter, 19,107 of wool, and 5,740 tons of hay. There were 1,662 horses, 1,698 milch cows, 2,463 other cattle, 5,975 sheep, and 3,898 swine. Capital, Paulding.

PAULDING, Hiram, an American naval officer, born in Westchester co., N. Y., Dec. 11, 1797. He is a son of John Paulding, one of the captors of Major André. He entered the navy as a midshipman in 1811, and was in the battle of Lake Champlain, for which service he received a sword from congress. In 1843 he attained the rank of captain, and in 1857, while in command of the home squadron, broke up an expedition against Nicaragua headed by William Walker. The main body of this expedition, commanded by Walker in person, landed at Punta Arenas in the harbor of Greytown, Nov. 25. Paulding arrived on Dec. 6 in his flag ship the Wabash, and on the 8th landed a force under the command of Capt. Engle, when Walker surrendered with 132 followers, who were disarmed and sent to the United States. Paulding acted on this occasion without specific instructions, and his arrest of Walker on foreign soil was not fully approved by the executive. In December, 1860, Nicaragua presented him with a sword and also offered him a tract of land; the latter, however, the United States senate did not allow him to receive. In July, 1862, he was made a rear admiral on the retired list. From 1862 to 1866 he was in command of the navy yard at New York, in 1866 was appointed governor of the naval asylum in Philadelphia, and in

1869 was port admiral at Boston. He has published "Journal of a Cruise among the Islands of the Pacific" (New York, 1831).

PAULDING, James Kirke, an American author, born at Nine Partners, Dutchess co., N. Y., Aug. 22, 1779, died at Hyde Park in the same county, April 6, 1860. After a village school education and a course of self-instruction he removed about 1800 to New York, residing with his brother-in-law William Irving. In conjunction with him and with Washington Irving he produced the series of "Salmagundi" papers, which terminated with the 20th number, June 25, 1808; and as no division of the contributions was attempted, they were afterward incorporated in Irving's works. In 1814 he was made secretary to the board of navy commissioners; subsequently for 12 years he was navy agent at New York; and he was secretary of the navy from 1837 to 1841. His principal works are: "The Diverting History of John Bull and Brother Jonathan" and "The Lay of the Scotch Fiddle," a parody of "The Lay of the Last Minstrel" (1813); "The Backwoodsman" (1818), his longest and best poem; "Salmagundi" (1819), a second series wholly by himself; "A Sketch of Old England by a New England Man" (2 vols., 1822); "Koningsmarke, the Long Finne" (2 vols., 1823; 2d ed., 1835); "Old Times in the New World," and "John Bull in America, or the New Munchausen" (1824); "Merry Tales of the Three Wise Men of Gotham" (1826); "The Book of St. Nicholas, a Series of Stories of the Old Dutch Settlers" (1827), purporting to be translated from the Dutch; "Tales of the Good Woman, by a Doubtful Gentleman" (1829); "Chronicles of the City of Gotham, from the Papers of a Retired Common Councilman" (1830); "The Dutchman's Fireside" (1831), a tale of the old French war and the most successful of all his works; "Westward Ho!" (1832); a "Life of George Washington" (1835); "View of Slavery in the United States" (1836); "A Gift from Fairy Land" (1838), illustrated by Chapman; "Affairs and Men of New Amsterdam in the Times of Governor Peter Stuyvesant" (1843); "The Old Continental, or the Price of Liberty" (1846); and "The Puritan and his Daughter" (1849). In 1847 he published a volume of "American Comedies" in conjunction with his son, William Irving Paulding, who has published the "Literary Life" of his father (1867), and a posthumous volume entitled "A Book of Vagaries," which is included in an edition of Paulding's "Select Works" (4 vols., 1867–'8).

PAULI, Georg Reinhold, a German historian, born in Berlin, May 25, 1823. He studied at Berlin and Bonn, went to Great Britain in 1847 to pursue historical researches, and from 1849 to 1852 was private secretary of Baron Bunsen in London. He became *Docent* at Bonn in 1855, and professor of history at Rostock in 1857, and at Tübingen in 1859. The objection of the Würtemberg authorities against his strictures on their political course put an end to his connection with the latter university in 1866. In 1867 he received from the Prussian government the chair of history at Marburg, and in 1870 at Göttingen. His principal works are: *König Alfred und seine Stellung in der Geschichte Englands* (Berlin, 1851; English translation, edited by Thomas Wright, London, 1852; another, 1853); the continuation of Lappenberg's *Geschichte von England* from the 12th to the 16th century (vols. iii.–v., Gotha, 1853–'8); an edition of Gower's *Confessio Amantis* (3 vols., London, 1857); *Bilder aus Alt-England* (Gotha, 1860; English translation by E. C. Otté, London, 1861); *Geschichte England's seit den Friedensschlüssen von 1814 und 1815* (2 vols., Leipsic, 1864–'7); *Simon von Montfort, Graf von Leicester, der Schöpfer des Hauses der Gemeinen* (Tübingen, 1867); and *Aufsätze zur englischen Geschichte* (Leipsic, 1869).

PAULICIANS, a sect of eastern Christians, of obscure origin. It probably originated in the middle of the 7th century, its founder being Constantine, a Marcionite preacher of Mananalis, near Samosata on the Euphrates, who took the name of Sylvanus, as that of one of Paul's companions (Silas), and established the precedent, closely followed by the brethren of the sect, of assuming the names of those who were friends of the great apostle. After 27 years of labor, Constantine was put to death as a heretic (about 684). The officer Simeon, sent to put down the heresy, became a convert, took the name of Titus, assumed the leadership of the sect, and was in his turn, after three years of toil, burned at the stake. His successor was Paul, under whose sons, Timothy and Theodore, the sect was rent by schism, Timothy holding to the transmission of spiritual gifts by apostolic succession, which Theodore rejected. Timothy (whose proper name was Gegnæsius), having adroitly evaded the charges of heresy, continued his preaching for 30 years. On his death another schism arose. The sect had gradually increased and diffused itself, until it was found not only in Syria and Armenia, but in the provinces of Asia Minor. About the beginning of the 9th century the conversion of the Galatian Sergius by a Paulician woman gave new life to the sect. Under the new name of Tychicus, he preached as an evangelist in every part of Asia Minor, imitating the apostle not only in his discourse, but in his manner of life. The Paulicians were now driven beyond the territories of the empire to find protection from the Saracens, and reprisals were made, until Sergius, though he had protested against this return of evil for evil, was in 835 assassinated by a fanatic named Izanio. Yet the sect continued to grow and spread. Under the empress Theodora, a new expedition was sent to exterminate them from Armenia, and 100,000 perished. About 970 the emperor John Zimisces transported a large number of the sect to Philippopolis in Thrace, whence they were able to extend themselves in Europe, not justifying by any change of faith the emperor's hope of their conversion. A similar attempt by Alexis Comnenus a century later had hardly better success. The sect continued to flourish under other names, and the principles of the Paulicians were perpetuated by the Euchites, the Bogomiles, the Cathari, the Waldenses, and to some extent by the English disciples of Wycliffe.—The Paulicians held that the evil spirit, born of darkness and fire, was the creator of the lower world; that the soul of man, originally related to God, had been made liable to sin by its union with the flesh; that all men are capable of recovery; that Christ brought with him from heaven a body of finer mould, with which he passed back to heaven when his work of redemption was finished; that the mother of Christ was not sinless or a proper object of worship; that the cross was properly a symbol of Christ's diffusive love, and not of the curse which he bore or of his vicarious sufferings. They denied the validity of the sacraments, interpreted baptism and the Lord's supper spiritually, would not recognize any priestly dignity, and insisted upon simplicity both in the ritual and in the households of the church. They rejected the Hebrew Scriptures, but rated highly the study of the New Testament, and especially honored those who would multiply and expound its record.—The ancient authorities on the Paulicians are Photius and Peter of Sicily, ambassador to Armenia of the emperor Basil (868).

PAULINUS. I. Pontius Meropius Anicius, Saint, bishop of Nola in Campania, born in Bordeaux about 353, died June 22, 431. He was descended from an ancient senatorial family, and his father was prætorian prefect of Gaul. He studied eloquence and law in Rome, and practised with success at the Roman bar. In 378 the emperor Gratian, at the instance of Ausonius, bestowed on him the rank of consul, in which he distinguished himself chiefly by his benevolent use of his immense wealth and that of his wife Therasia. After his acquaintance with St. Ambrose and St. Athanasius he gave up all his dignities, and withdrew with his wife to a country residence near Barcelona, where he spent his time in study, prayer, and beneficence. In December, 393, the death of his only son induced him, with the consent of his wife, to ask the bishop of Barcelona to admit him to the priesthood; and Therasia having soon afterward become a nun, Paulinus was ordained and went to Italy. Repelled by Pope Siricius, Paulinus went to Nola in Campania, where in 409 he was forced to become bishop. In 410 he was taken prisoner and carried away by the Goths, but they soon restored him. Pope Gregory the Great relates that Paulinus sold himself to the Vandals to redeem the son of a poor widow, having previously given all he could dispose of to purchase the freedom of other captives. He labored in a garden as a slave till his master discovered his merit and restored him to liberty. Paulinus wrote a large number of ascetic works and hymns; but only his "Discourse on Almsgiving," "History of the Martyrdom of St. Genesius of Arles," and hymns are extant. These were first published by Josse Badius (Paris, 1516), and Rosweyde (Antwerp, 1622, with Sacchini's "Life of St. Paulinus"). The best edition is that of Muratori (Verona, 1736). The feast of the saint is celebrated on June 22. **II. Saint,** bishop of Treves in 349, the first confessor who suffered and died in the West during the Arian persecution in defence of the divinity of Christ. In 353 he was among the few who resisted the bribes and threats of the emperor Constantius at the council of Arles. He was deposed by the emperor, and banished to Phrygia, where he died in 359. His feast is celebrated on Aug. 31. **III. Saint,** first archbishop of York, died Oct. 10, 644. He was sent to England in 601 by Pope Gregory the Great, ordained bishop of the Northumbrians in 625, and appointed archbishop of York in 627. He baptized King Edwin April 12 of the same year. In 633 he retired to Kent, and became bishop of Rochester in the autumn of that year. His life is included in Newman's "Lives of the English Saints." **IV. Saint,** a patriarch of Aquileia, born near Friuli about 730, died probably Jan. 28, 804. He was distinguished as a teacher of the humanities when Charlemagne wrote him a complimentary letter in 776, and bestowed on him a domain in Lombardy. That monarch also caused him to be elected patriarch of Aquileia. With Alcuin he was intrusted with the examination of the writings of the heresiarchs Felix of Urgel and Elipandus of Toledo. Paulinus also preached with great success among the heathens of Carinthia and Styria. His works were published by Madrisio (1 vol. fol., Venice, 1737; 2d ed., 1782). His feast is celebrated on Jan. 28.

PAULISTS, a society of missionary priests of the Roman Catholic church, founded in New York in 1858 by Isaac Thomas Hecker. Father Hecker and his first associates belonged to the order of Redemptorists, and were laboring in the home mission in New York, when they conceived the design of forming themselves into a new society composed chiefly of men whose native tongue was the English, and whose intimate acquaintance with American institutions and customs would enable them to labor more efficiently. Their purpose was approved by Archbishop Hughes, after the pope had granted their release from their religious vows in the Redemptorist order, and issued in their favor the letter of commendation which is preliminary to canonical approbation. They formed themselves into a society organized on the same principle as the Oratorians and Sulpicians, a strict union of the houses and members under one superior general, held together by a voluntary agreement, with rules and laws enacted by the whole body in general chapter. This society is called "The Congregation of the Missionary Priests of St. Paul the Apostle." Their first convent and church were established in New York at the corner of 59th street and 9th avenue. Their missions and retreats were attended with such success that they have been called to labor in many states of the Union, including California. They have published several volumes of sermons and discourses delivered by the members. Some works on theological subjects have been also published by Fathers Hecker, Stone, and Hewit; and they have founded and edit "The Catholic World," the most important Roman Catholic periodical of America. In 1875 they numbered 15 priests.

PAULOWNIA, the generic and common name (given in honor of the princess royal Anna Paulovna of the Netherlands, afterward queen) of an ornamental tree introduced from Japan in 1840; in this country it is sometimes corrupted into polony. It belongs to the *scrophulariaceæ* or figwort family, and is remarkable among plants of that order for attaining the stature of a tree. It grows 20 or 30 ft. high, and has much the habit of a catalpa, and the leaves are similar to those of that tree, but much more downy. The flowers, produced in April or early in May, in large clustered panicles, are somewhat cylindrical with rounded lobes at the mouth; they are 1½ to 2 in. long, violet-colored, with a slight, pleasant fragrance; the segments of the five-cleft calyx are very thick and leathery, and densely covered with a rusty down; the flowers are succeeded by ovate, pointed, two-valved capsules, an inch or more long, containing numerous small winged seeds. When this tree was first introduced into the United States, having been preceded by glowing accounts from abroad, it made a sensation among horticulturists, and was extensively planted; and indeed few trees are more attractive than a well grown specimen crowded with its large clusters of handsome flowers, but it is attended by so many disqualifications that it is now comparatively neglected. It is barely hardy north of the city of New York, and even there it often fails to bloom for several seasons in succession; the flower buds are formed the previous season, and are so highly developed that a severe winter is quite sure to destroy them; and the tree, on account of the dull color of its very downy foliage, is not especially ornamental unless it flowers. When it blooms after a favorable winter, it is loaded with pods, which remain until they are beaten off by the winds, often continuing on during the following summer and much disfiguring the tree by their large masses of brown color. In a favorable climate the growth of the young trees from the seed or from cuttings is remarkably rapid and vigorous, and the leaves upon such trees are frequently 2 ft. across, but on old trees they are less than half that size. The better use for the paulownia is to disregard its flowers, and to cut it down to the ground every year; in spring several vigorous shoots will start from the base, one of which if allowed to remain will grow 15 ft. or more high in the season, with a spread of foliage of truly tropical luxuriance; or if a large clump is desired, several shoots may be allowed to grow; fine garden effects may be produced by this treatment. It is readily propagated by seeds or from cuttings of the roots.

Paulownia imperialis.

PAULUS, Heinrich Eberhard Gottlob, a German theologian, born at Leonberg, Würtemberg, Sept. 1, 1761, died in Heidelberg, Aug. 10, 1851. He studied the oriental languages and divinity at Tübingen and Göttingen, and went to England to examine the manuscripts in the libraries of London and Oxford. In 1789 he became professor of oriental languages at Jena, and in 1793 of theology; in 1803 professor of theology at Würzburg; and from 1811 to 1844 he taught exegesis and philosophy at Heidelberg. Among his numerous works are: *Philologisch-kritischer und historischer Commentar über das Neue Testament* (4 vols. 1800–'4); *Das Leben Jesu* (1828); and *Exegetisches Handbuch über die drei ersten Evangelien* (1830–'33).

PAULUS, Lucius Æmilius, surnamed MACEDONICUS, a Roman general, the most celebrated member of the distinguished family Æmilius Paulus (or Paullus), of the Æmilia gens, born in Rome about 230 B. C., died there in 160. He was the son of the consul of the same name who fell in the battle of Cannæ (216). In 194 he was a commissioner to found a colony at Croton, in 192 was chosen curule ædile, and in 191 prætor, having the province of Further Spain assigned to him, and receiving the title of proconsul. He made a successful campaign against the Lusitani, and established order in his province. In 182 he was elected consul, and during the next year defeated the Ingauni, a people of Liguria, receiving a triumph on his return to Rome. In 168 the ill success of the war against

Perseus of Macedon induced the people to call upon him to take the field again, and he was at once elected consul. Without delay he set out for Macedonia, and, meeting the enemy near Pydna, gained so decisive a victory as to end the war immediately, Perseus surrendering himself to his conqueror, whose treatment of him was kind and courteous. After governing Macedonia as proconsul for nearly a year, he made a journey through Greece, then formally settled the affairs of his province with 10 Roman commissioners at Amphipolis, gave up 70 towns of Epirus to pillage (almost the only injustice recorded of him), and finally returned to Rome, bringing enormous quantities of treasure and plunder, nearly all of which he paid into the state treasury, and being received with a triumph. The only office held by him after this was the censorship in 164.

PAULUS ÆGINETA, a Greek physician, born in the island of Ægina probably in the 7th century A. D. He was called "the traveller" (*περιοδευτής*), and appears to have visited Alexandria, and obtained there his title of *ἰατροσοφιστής* or scientific physician. He compiled with materials from Galen and others a treatise in nine books on medicine, still extant, besides one on female diseases, mostly lost. His works were translated into Arabic by Honain ibn Ishak. There is an English translation of part of them by Francis Adams (London, 1834).

PAUL VERONESE. See CAGLIARI.

PAUMOTOU (or **Touamotou**) **ISLANDS.** See LOW ARCHIPELAGO.

PAUPERISM, that degree of poverty for which public relief is provided. Extreme poverty must always have existed, and among communities in any degree civilized has been provided for by law and social customs. The Mosaic jubilee was an ingenious plan for preventing pauperism by a redistribution of land and a cancelling of debts every 50 years. In the Grecian states institutions of various kinds provided for the relief of the poor, and the same is most probably true of the Roman republic and empire. It is true that in the ancient communities, as in some modern ones, slavery in a measure took the place of pauperism; and at Rome the system of clients and patrons did something to relieve the poor without expense to the state. But in Rome during the historical period the relief of the poor was commonly one of the most important functions of the state, as it is now in England and other European countries. The favorite method of performing this function was by a cheap sale or an actual gift of corn to the people, under the so-called "corn laws" (*leges frumentariæ*), first formally enacted at the instance of Caius Gracchus, in 123 B. C. Two years later the patricians revoked this Sempronian law, but it was reënacted in 73 B. C., under the consuls Cassius and Terentius. Cato of Utica caused it to be amended a dozen years later, and at the time of Cæsar's Gallic wars, Clodius made the distribution of corn wholly gratuitous. When Cæsar became dictator, he found 320,000 persons receiving this charity; he reduced their number to 150,000, but even this was probably one tenth of the whole population. The civil war raised the number again to 300,000, which Augustus reduced to 200,000. Under the Antonines there were sometimes 500,000, but then the whole population had greatly increased. Aurelian gave the poor bread and pork instead of the unground wheat, and in course of time the distributions were extended from Rome to Constantinople, Alexandria, and Antioch. Mendicancy was common under the emperors. In all the early Christian societies it became a rule to apply that part of the church revenue which remained, over and above what was necessary for the maintenance of the clergy and the expenses of public worship, to the support of the needy. This was called the patrimony of the poor, and it was shared even with the heathen. The first Christian emperor, in making Constantinople the chief centre of the gratuitous distribution of bread and grain, did not interfere with the eleemosynary laws in existence among the various churches. Julian the Apostate maintained the customary distributions, and reproached his pagan subjects with not emulating the generous charity of "the Galileans," who "support not only their own but the heathen poor." These annual gratuities became so important that Theodosius the Younger made a special law to regulate them; and any interruption in these supplies produced wide-spread misery, as happened in Africa when that province was cut off from the empire after its conquest by Genseric. Beneficent institutions were multiplied everywhere after the 4th century both by the charity of the sovereigns and that of private individuals. Monastic establishments were also multiplied throughout the East and West; and thus almsgiving soon became an abuse, and mendicity an evil which Charlemagne and other princes after him tried in vain to check.—*History of the Modern Poor Laws.* By poor laws are here understood legislative enactments levying a rate in aid of persons unable to work or to find employment. There is no record of any such legislative measure of a general character in any European country before the 16th century. In England, in Saxon times, the householder was bound to provide for his laborers, and men who had no master were assigned to some householder. After the feudal times, by the common law, the poor were to be sustained in each parish by its pastor and inhabitants, so that none should die of hunger. A similar customary law existed everywhere on the continent. The earliest laws relating to the poor throughout Christendom were directed against beggary and vagrancy; they are anterior even to Charlemagne. The church assisted the legislator to arrest and localize the growing evil of mendicity. Thus the second council of Tours in 567 decreed that every city should make provision for its own poor, and that in every parish thereof the rector and parishioners should support their own paupers. In England more than a hundred laws against beggary and vagrancy were enacted successively till after the reign of Henry VIII., and enforced with extreme rigor. Still the evil grew. It was very great before the reformation, and was still greater afterward; but the suppression of the monasteries, though one of the causes, was not the chief cause of the increase of pauperism under the Tudors. As to the poor laws properly so called, the first recorded instance of a rate in aid appraised and collected in England for the relief of the poor is that of a manor in Cambridge then and now belonging to Merton college. This manor in 1319 was, together with other Cambridge parishes, subjected to an agistment for the relief of the sufferers by a famine then prevalent. The first known English statute for the relief of the disabled poor was that of 12 Richard II., c. 7 (1388). That of 27 Henry VIII., c. 25 (1535), first made compulsory assistance incumbent on each locality; the parishes were obliged to provide for the disabled poor by a fund raised by voluntary contribution or alms, and to find work for the able-bodied. This disposition was confirmed by 1 Edward VI., c. 3 (1547). By 5 Elizabeth c. 3 (1563), all who refused to contribute voluntarily to the parish poor fund were to be compelled by the magistrates, who were empowered to tax the recusants and even to imprison them. In 1573 another law authorized the justices to assess all parishioners, and houses of refuge were ordered to be provided for the helpless poor. Finally, in 1601, came the statute known as 43 Elizabeth, which served as a basis for all subsequent legislation levying a rate in aid of the poor. For this purpose a tax was imposed on every parishioner, and a board of overseers was to be named by the local justices to aid the churchwardens in applying the poor fund to the relief of the helpless, the apprenticing of children, and the providing of work for the able-bodied. This was completed in 1662 by the statute 14 Charles II., c. 12, known as "the law of settlement and removal," which will be more fully explained hereafter; it aimed at determining the parish or locality in which every pauper should be relieved. Thus relief to the poor and the prevention of mendicity were made a parochial function and duty; and subsequent legislation till the year 1723 was only directed at so checking the powers of the overseers of the poor by the action of the local justices as to prevent the former from being either too liberal or too stringent, with a view of preventing the increase of pauperism. The act of 1723 (9 George I., c. 7), authorizing several parishes to unite in maintaining a workhouse and otherwise providing for their paupers, was the first step toward centralization. This law was relaxed by that of 1795 (36 George III., c. 23), and still more by that of 1814 (55 George III., c. 137). But pauperism and the taxes necessary for its support increased so alarmingly, that in 1817 the fear was expressed by a royal commission of inquiry that the assessment would end in swallowing up the profits of the land. After several other parliamentary inquiries, the basis of a new system of public relief was laid by the law of 1834 (4 and 5 William IV., c. 76) and by that of 1835 (5 and 6 William IV., c. 69). By these acts the superintendence of public charity was centralized in the three capitals of the United Kingdom, and the local service of the poor in parish unions created for that purpose. This system was at first put on trial for five years, and then continued by successive enactments. Retaining the best features of the act of 1601, it provides for a central board of three commissioners for the general superintendence and control of all bodies charged with the management of funds for the relief of the poor. Subordinate to these are nine district commissioners, and the whole are subject to the direction of the secretary of state for the home department. The commissioners are empowered to order workhouses to be erected or hired, enlarged or altered, with the consent of a majority of the board of guardians. They may unite a number of parishes in a poor-law union, for the purpose of a more economical and effective administration, but in such a way that each parish shall defray the actual cost of the support of its own poor. The parishes composing a poor-law union elect their board of guardians, without the consent of a majority of whom money cannot be raised for building purposes; but the masters of the workhouses, and other paid officers, are under the orders of the commissioners, and removable by them. No wages are paid to the poor out of the poor rates, and except in extraordinary cases relief is only given to the able-bodied poor and their families within the walls of the workhouse, where labor is required of them in return for it. The provisions in regard to illegitimate children are intended to materially check bastardy. The putative father, if prosecuted, is required to pay the sum fixed by law 2*s.* 6*d.* per week) to the union instead of the mother, and the mother and child are received into the workhouse. The children of paupers are educated in workhouse schools. In two years after its passage this law had reduced the cost of the relief of the poor 40 per cent. A similar system was introduced into Ireland in the first year of Queen Victoria, and by 10 and 11 Victoria, c. 90, a central board of commissioners was established, distinct from the English board, but with analogous powers. There are about 180 poor-law unions in Ireland, supporting by assessment infirmaries, hospitals, and workhouses. There are besides numerous free institutions maintained by private charity. In Scotland the old system of parish relief continued in force till 1845, when a special statute, 8 and 9 Victoria, c. 83, established a central board called the board of supervision, which has control of the parochial or union boards, as in England. No relief is afforded by the Scotch law to able-bodied adults. The mode of assessment defined by 24 and 25 Victoria, c. 37, leaves it optional to each board to have one half the poor rate paid by owners of land and one half by occupiers, or by the latter and all other inhabitants. In 1854, 194 parishes still retained the old voluntary system, and 689 had adopted the new. In England, on the contrary, the poor rate is levied by the churchwardens and overseers on the occupiers of land, after such rate has been confirmed by the justices. This is a specific sum in the pound according to the annual value of the land. Thereby the rate becomes a tax on the occupier, and not primarily on the owner. The law of settlement and removal also differs in Scotland from that which prevails in England. In the former a settlement can be acquired by a residence of five years. Children enjoy the settlement of their parents, and wives that of their husbands; and in default of these the birth settlement is always allowed. In England the law of settlement, based on the act of 1662, and subsequently modified, has given rise to much costly litigation and occasioned great hardship to the poor. Its object is to determine the particular parish among the 600 in England and Wales bound to support a pauper, and to which such pauper can be removed in case of necessity. Edward V. was the first to add a law of removal to the old law of settlement, enjoining that the impotent poor should be conveyed from constable to constable to their birthplace, or to the place in which they had dwelt for the last three years, there to be settled and maintained by charity. A settlement is at present acquired by birth, by parentage, by marriage, by residing as an indentured apprentice for 40 days in a parish, by renting a tenement for £40 and paying the poor rate on such rent for one year, and by acquiring in a parish an estate worth £30 and residing on the same for 40 days. A woman acquires by marriage the settlement of her husband, and should he have none she retains her maiden settlement. Till 1834 it was customary to remove the impotent poor to their place of settlement as determined by law. Subsequently, but before 1850, it was enacted that no person should be removed from a parish after a residence therein of five years. At present no pauper who has been allowed to reside for one year in a parish or union is removable therefrom. The chief difference in the law of settlement before and since 1834 is that formerly a settlement was acquired by the exercise in any parish of a public annual office, such as that of constable, sexton, sheriff, overseer, &c., by hiring or service and a residence of 40 days in a parish in such quality, and by indenture as a sea apprentice; while the new law, by making the impotent pauper irremovable from a parish in which he has been allowed to reside for one year, thereby grants him a settlement for all practical purposes, while it is very difficult for a healthy workman to acquire a good new settlement, or to lose his old settlement when it happens to be a bad one. —The history of pauper legislation in France before the close of the 16th century does not differ materially from that of England for the same period. During the middle ages it required the united efforts of the civil and ecclesiastical authorities to repress or restrain mendicity. As in England, the principle acted upon was that each city, parish, or district should support its own paupers, and that they should be sent there for relief. The edict of King John II. in 1350 is the basis of all subsequent legislation in France tending to alleviate distress or restrain mendicancy. The wars and disorders of the 16th century having given rise to a great increase of pauperism, various measures were adopted by the government and the provincial and municipal authorities to meet the exigencies of the case. The first institution resembling our modern central poor boards was *l'aumône générale* established in Lyons in 1531. This served as a model for the organization of *le grand bureau des pauvres* in Paris in 1544, which continued in existence till May, 1791. This board was empowered by Francis I. to levy a poor rate on all property, lay and ecclesiastical; and this poor rate, the first ever raised in France, was confirmed by Henry II. in 1551, and again by the famous edict of Moulins in 1566, which made it obligatory on all the communes of France to establish similar boards, and to assess all property holders for their support. Under Francis I. and his two immediate successors workshops had been established for the employment of pauper mechanics, and several public works undertaken by the government to afford labor to other classes of the able-bodied poor. Nevertheless in 1610 Paris contained 30,000 beggars. Louis XIII., Aug. 27, 1612, decreed the erection in Paris of a number of establishments, half hospitals, half workshops, three of which were opened soon afterward. This project was not fully executed till 1653, when the poor in Paris numbered upward of 40,000, and Louis XIV. established the vast organization known as the "general hospital" to check or remedy the alarming increase of pauperism. To the board of administration appointed by the king were subjected not only the poorhouses and hospitals opened by Louis XIII., but several new ones. The workshops were directed and handicrafts taught by 52 skilled workmen selected by the Parisian trades. In 1657 there were 5,000 persons in these institutions, and 10,000 in 1662. In the latter year this system of relief and compulsory labor was extended to all cities and large towns in the kingdom. But pauperism had gone on increasing so fearfully in the last years of the reign of Louis XIV., that in 1719 the regency government decreed that all vagrants and able-bodied paupers should be sent to the colonies.

This scheme was soon abandoned, and the authorities fell back on the old system of forced labor in institutions called "houses of correction." Louis XVI. in 1777 decreed the erection of a large number of these; but he soon found himself powerless to realize his designs. A great and sincere effort was made by the national assembly in 1791 to find an effective remedy for French pauperism. In March, 1793, after a succession of expensive experiments, it was decreed that central almshouses (*dépôts de mendicité*) should be established at the national expense, to which all able-bodied beggars without exception were to be sent; but it was only by the law of July, 1808, that this measure received a thorough execution. This law enacted that a central almshouse should be erected and maintained by the government in every department. In a short time 59 of these departmental almshouses were opened, calculated to accommodate 22,500 paupers; but only 33 were applied to their original purpose, and even these gradually became asylums for the insane and incurable, or were converted into jails. These almshouses were entirely neglected under the restoration. After the revolution of 1830 the causes and remedies of pauperism were once more thoroughly investigated by legislative commissions, and the system of departmental almshouses was revived on the principle that in future paupers should be incited to support themselves by their labor. Pauperism declined rapidly in consequence till 1848, when the withdrawal of government aid from the departmental almshouses was considered a virtual abrogation of the law of 1808. Under the second empire the central almshouses were favored by the government, while in the cities and communes local boards of charity (*bureaux de bienfaisance*) were established, with funds raised by voluntary contributions. In this way in 1860 upward of 1,300 institutions supplied relief to the impotent adult poor; foundlings, orphans, and abandoned children being provided for in appropriate asylums. The war of 1870-'71 increased destitution and disease enormously, while the public resources were proportionately lessened. In 1872, besides several new hospitals and asylums erected by private munificence, France possessed 46 departmental almshouses, and 12,867 local boards of charity. The minister of the interior has the general control of all charitable institutions in France, besides directing more immediately certain large establishments of a special character. The charities of Paris are controlled by a director acting under a council composed of eminent laymen and clergymen, the president of which is the prefect of the Seine. The local board of each city *arrondissement* distributes relief supplementary to that bestowed in the public hospitals and asylums; and the society of St. Vincent de Paul is very efficient in discovering hidden distress and distributing private alms. The communal or parish boards are composed of the mayor and pastor, assisted by some of the principal parishioners; and every means is taken by them to stimulate the generosity of the citizens.—As Belgium was under French rule in 1808, the law establishing departmental *dépôts de mendicité* applied to that country, and is still in force there. These, together with the numerous religious establishments, and a few free pauper colonies supported by private associations, afford considerable relief to the large pauper population. In Holland the chief features of the system of public assistance are the three pauper colonies of Amsterdam, Middelburg, and Groningen, in which all vagrant and able-bodied paupers are forced to work for their own support. There are besides free pauper colonies for destitute families, which are supported by private charity. In the Scandinavian kingdoms the ancient methods of parochial relief have been but little interfered with. The established church is still the principal minister of charity, the government only coming to the assistance of the parochial administration to check vagrancy and provide compulsory employment for the able-bodied. In Denmark assistance is given chiefly in the form of loans, which the poor are expected to repay by their labor. Throughout the German empire the laws against mendicity and vagrancy are strictly enforced. The ancient methods of parish relief are maintained, central workhouses and almshouses exist in every province, and the hospitals, asylums, &c., are aided by government grants. In most provinces a poor tax is raised by compulsory assessments, in others the property holders assess themselves; but if they do it too lightly, the rate is increased by the government. In the Austrian empire public assistance is also organized on the communal or municipal basis. The system of relief in general use outside of Hungary was first introduced in Bohemia in 1779 by Count Bouquoy, and was afterward sanctioned and propagated by the emperor Joseph II. The parish boards or "institutes of the poor" (*Armen-Instituten*) are composed of the pastor, two overseers or "fathers of the poor" (*Armenväter*), and an auditor, who is accountable to the parishioners. These confine themselves chiefly, and in many places exclusively, to relieving the impotent, and supporting lunatic asylums, lying-in and foundling hospitals, and orphanages. Switzerland in 1643 agreed upon a general law of settlement and removal, each canton binding itself to support its own poor, and mendicancy and vagrancy being severely punished. By the federal law of 1850 each commune is obliged to provide aid for the impotent and work for the able-bodied. Young people of both sexes are to be apprenticed out when unprovided for by their parents, and these are held responsible for the conduct of children under 14, and masters for that of their apprentices.—In European countries professing the Roman Catholic religion, the church until quite recently was the great administrator of public charity through her numerous institutions of beneficence and her religious orders. Since the suppression of these in Spain, Portugal, and Italy, no legislative provision resembling a regular poor-law system has been in operation. In Rome while under pontifical rule a "commission of relief" was intrusted with the direction of public charities. It was composed of a cardinal-president and 15 members. The city was divided into 12 districts, each of them being under the immediate superintendence of a member of the committee. In each parish within the district was a local board composed of the parish priest, two deputies (one a layman, the other a lady), chosen for two years, and a salaried secretary and treasurer. Alms were given in money, tools, and raiment. In Spain the hospitals and asylums formerly endowed for lunatics, the blind, and deaf and dumb, as well as for foundlings, &c., are still maintained by the government. Before the late revolutions the public treasury gave to each province a stated yearly sum in aid of the poor, the provinces themselves being bound to double this amount by voluntary or compulsory assessment.—*British Poor-Law Statistics.* Mr. N. W. Senior, who was one of the most active promoters of the poor-law amendment act of 1834, has pointed out the fact that the compulsory charity of England, from the time of Lord Bacon to that of the younger Pitt, was so cautiously administered by the parochial authorities, under the rigid law of settlement, and after the reign of George I. by the use of the workhouse test, that pauperism did not increase inordinately, in proportion to the increase in population and wealth. The able-bodied and industrious poor were not fed from the public revenues, as was the case during the wars with Napoleon, but it was the aged, the infantile, and the invalid poor who were relieved. The poor rate of England and Wales in 1673 was estimated (perhaps too highly) at £840,000, the population then being 5,500,000, or about the present population of Ireland. Of these, Gregory King estimated in 1688 that no less than 1,300,000 were "cottagers and paupers," besides 30,000 vagrants; the poor rate he calculated then as £665,000. Probably those strictly to be called paupers, in 1688 were not more than 500,000, or one in 11. In 1698 Fletcher of Saltoun estimated the mendicant poor of Scotland at 200,000, and said that their average number in times past had been 100,000; the population of Scotland did not then probably exceed a million. From these figures, and from the statements of Sir Josiah Child and Defoe, we may infer that pauperism in Great Britain 200 years ago was as great an evil proportionately as it now is. But between 1792 and 1832 it was stimulated in England by a most imprudent administration of the original poor law of 1601. Certain acts passed in 1795–'6 at the instance of Mr. Pitt, allowing the parochial relief of "industrious" poor persons at their own houses, practically accomplished in a few years what the act 43d Elizabeth had not done in two centuries, and, in the words of Mr. Senior, "let in a flood of pauperism, which in the years succeeding the Napoleonic wars threatened the destruction of property and civilization." In France, during the revolution of 1792, the same laxity of poor-law administration prevailed, until checked by the prudent regulations of Napoleon, who recognized the principle, laid down by Child and Defoe, that the first duty of charitable administration is to prevent the need of charity. The division of landed property in the revolution has doubtless done much to check the growth of pauperism in France, more than the absence of a compulsory poor law, upon which many writers have commented. A poor law in itself neither increases nor diminishes pauperism, except as it is well or ill administered. There is no distinctive poor rate in France, yet the amount raised by taxation for public charity in that country is now more than 15,000,000 francs yearly. No country has had, for the past hundred years, so high a poor rate as England. In 1773, Lord Kames estimated it at £3,000,000; but in fact it was only about £1,600,000 in 1776. In 1801 it was more than £4,000,000; in 1818, £7,870,801, the population at that time being 11,575,000, or something more than twice as many as in 1688, when Gregory King's tables were made out. Thus in 130 years the population had doubled and the outlay for the poor had nominally become ten times as great. This state of things alarmed the government, and from 1818 to 1834 persistent efforts were made to modify the poor laws, resulting (1834) in what has since been known as "the new poor law." Its first execution reduced the outlay for the poor from nearly £6,500,000 a year to £4,000,000; but this has since risen to £8,000,000, though for 1874 it was but about £7,500,000, or less than in 1818, the population having in the mean time nearly doubled. The average yearly cost of pauperism in England in the ten years 1819–'29 was £6,300,000; 1829–'39, £5,700,000; 1839–'49, £5,200,000; 1849–'59, £5,500,000; 1859-'69, £6,500,000; since 1869, £7,750,000. The highest cost was in 1872, £8,000,000; the lowest for 60 years was in 1837, £4,044,741. The number of paupers on a given day in England and Wales has sometimes been more than a million, but for several years it has been decreasing. This decrease has taken place in spite of the abolition of many of those restrictions on the freedom of the poor which were formerly imposed by the "law of settlement." It was supposed that the increase of the "irremovable" poor, as they are called, would work an increase of actual pauperism, but such does not seem to be the case.—*Relative Amount of Pauperism.* In proportion to the population of England, there has been a great diminution of pauperism since 1870, when, with about 22,400,000 inhabitants, there were more than 1,000,000 paupers. At Christmas, 1873, there were but 781,470, of whom 106,879 were in London; and at Christmas, 1874, there were but 750,414 paupers in a population of more than 23,500,000, and 97,357 of these were in London. In four years, therefore, there was a decrease of more than 25 per cent. in all England and Wales, while in the same period the decrease in London had been 20 per cent. The cost of pauperism in the United Kingdom in 1870 was £9,593,000, or 6*s.* 4*d.* a head of the whole population. In the United States in the same year, with a population about one fourth greater, the cost of pauperism did not exceed £3,000,000, or less than a third part of what was paid in England, Scotland, and Ireland. It may be noticed also that the number of paupers in the United States is much less in summer than in winter, while in England the season makes little difference in the number. Thus on July 1, 1873, there were supported and aided in England and Wales 822,000 persons, of whom 275,838 were children under 16, and 384,468 were aged and infirm adults. On Oct. 1, 1874, there were 721,000 paupers; on Nov. 1, 720,000; and on Dec. 25, 750,000. Here we see 100,000 more paupers receiving aid in midsummer of one year than in midwinter of the next year; a thing that certainly never happened in the United States, and but rarely in England. In ordinary years the number of the poor receiving aid in England is greatest in the latter part of January and early in February, and least in the early part of October. Thus, on Oct. 12, 1870, the number receiving aid in England was 882,660, of whom 134,087 were in workhouses, and 748,573 were receiving outdoor relief or supported in lunatic asylums. But on Feb. 28 of the same year 1,092,578 were receiving aid, of whom more than 165,000 were in workhouses; and on Jan. 1, 1871, the whole number was 1,085,963, of whom 168,073 were in workhouses. This would indicate that something less than 20 per cent. of the maximum number of English paupers drop off the list when the number reaches its minimum; in other words, that more than four fifths of English pauperism is permanent, without regard to the season of the year. In America it is probable that no more than three fifths of the pauperism is permanent. In most European countries there has been an improvement in the condition of the poor, in consequence mainly of the large emigration to America and Australia. Thus Ireland and those parts of Germany from which there has been the largest emigration are also the regions that exhibit the greatest diminution of pauperism. In Ireland during the famine of 1846–'7, and for a few years afterward, the average number of paupers receiving aid ranged from 200,000 to 250,000, while in 1874 the average number receiving aid of all kinds did not exceed 75,000, a decrease of two thirds in a quarter of a century. The cost of relieving the Irish poor has not much diminished, however, being about £1,100,000 in 1852 and about £1,000,000 in 1874. Of the latter sum, £141,916 was for medical charities, and the number reported as under medical care during the year was 700,000, or an average of about 2,000 a day. The number of Irish paupers admitted to workhouses in 1874 (the year ending Sept. 29) was 252,000, against 249,000 in 1873; a slight increase for that year, in which the emigration to America fell off in consequence of the American panic of 1873. The number of outdoor poor in Ireland during 1874 was 74,000, against 69,500 in 1873; the total of both classes of paupers was 319,242 in 1873 and 326,618 in 1874. But in 1870 there had been 441,446, including 382,152 indoor and 59,294 outdoor paupers. The English pauper statistics do not give the whole number relieved and supported during the year, but only those at given dates; a fact which should be borne in mind in making comparisons between the two countries. If the English figures were made up as those of Ireland are, the total would probably exceed 2,500,000 paupers in a year (or more than one in ten of all the inhabitants) who are either occasional or permanent paupers. It is in this sense, probably, that we must understand the percentage of pauperism in Belgium and some other countries, where it seems very large, sometimes one in seven of the population. Belgium, Switzerland, and France, countries from which there is comparatively little emigration to America, are precisely those which show but little decrease in pauperism, or even an increase. In 1856 Belgium had a population not much greater than that of the state of New York in 1870, namely, 4,529,461. Yet while New York in 1870 supported an average of less than 50,000 paupers, Belgium in 1856, according to official figures, supported more than 500,000, and an average probably of more than 100,000; and this number has not much diminished since. In France the number aided at home by the *bureaux de bienfaisance* in 1871 was reported as 1,847,386, in a total population of 36,500,000. In 1861, when the population (before the separation of Alsace and Lorraine) was somewhat greater, the number aided was but 1,159,539, showing a considerable increase of poverty, in consequence of the Franco-Prussian war and other causes. In Prussia, however, and in Germany generally, and apparently in Austria, pauperism has decreased, as in England and Ireland. The increase in the United States is but slight, and is caused apparently by the emancipation of the slaves in the southern states, and by the financial troubles since the autumn of 1873. Up to that time, in the northern states, pauperism in proportion to the population was decreasing.

—*Proportion of Paupers to Population.* The statistics of pauperism are very deceptive for all purposes of comparison, because they are differently made up in different countries. It is customary, however, to compare the pauperism of different regions by ascertaining in each country the proportion which those persons who receive public charity bear to the whole population. Without vouching for the accuracy of the computations made, we will present some of these statistics of proportionate numbers and cost, taken mainly from the work of A. Emminghaus, *Das Armenwesen und die Armengesetzgebung in Europäischen Staaten* (Berlin, 1870). He quotes Hausner's "Statistics of Europe," which gives the proportion of paupers in Belgium as one to every 7⅓ inhabitants, in Holland one to every 7, in Baden one to 16, in Switzerland one to 19⅓, in Great Britain one to 22, in South Germany. about one to 25, in France one to 29⅓, in North Germany about one to 30, and in Prussia and Austria about one to 34⅓. In the United States the proportion of inhabitants to paupers is nowhere less (according to European modes of computation) than 75 or 100 to one, and in the whole country there must be at least 150 inhabitants to one pauper. The population of Ireland in April, 1871, was 5,402,759, and the number of paupers from 60,000 to 75,000, giving a proportion of 72–90 to one. The English paupers then numbered 1,000,000, and the population of England (always including Wales) was 22,704,108. This gives the proportion of inhabitants to paupers as less than 23 to one, showing pauperism to be more than three times as common in England as in Ireland. In Scotland the population in 1871 was 3,360,018; the number of paupers cannot be given very exactly, by reason of the method of computing them, but it was between 100,000 and 130,000, or at the rate of one pauper to every 26 or 33 inhabitants. The foregoing statements relate to the average number of paupers; if the whole number relieved during the year is considered, the proportion of paupers to population will seem much larger. It is probably safe to say that in all the countries of Europe, save Russia, Turkey, and Greece, the proportion of paupers constantly supported or aided by public charity is as 3 to 100, and that the pauper class in all Europe numbers not less than 15,000,000, perhaps 25,000,000. Among the 42,000,000 who lived in the United States in the beginning of 1875, it is not probable that the pauper class numbered more than 400,000, or that the average number of paupers aided was so great as 250,000.—*Indoor and Outdoor Relief.* These terms, borrowed from the technical dialect of the English poor-law board, are used rather loosely to signify relief given in workhouses (indoor) and that given elsewhere, generally at the pauper's own home. The English workhouse corresponds to the American poorhouse or almshouse, and it is a favorite theory of British political economists that all persons who apply for public charity should have their sincerity tested by sending them to the workhouse. This of course cannot always be done, but some approach to the "workhouse test" is often found the best means to reform the administration of charity. The class of "indoor paupers" should also include those insane poor who are confined in hospitals and asylums; but this is not done in England, where pauper lunatics are put down among those receiving outdoor relief. This is one reason why the cost of outdoor relief appears so large in England, as compared with the cost of maintaining the workhouses; for there are now about 50,000 pauper lunatics in England who are maintained from the poor rates at a cost of nearly £1,000,000 a year. This class of the poor is steadily increasing in all countries. The number of indoor paupers during the year is much larger, of course, than the daily or average number. Thus, in 1871, although there were but 42,875 persons in the workhouses of Ireland on Sept. 29, and only 48,738 on Jan. 6, 1872, there were yet 183,135 persons admitted to Irish workhouses during the year, including 2,103 births. This is an average of more than 15,000 admissions in a month, or nearly one third as many monthly admissions as the whole average number in the workhouses (46,000). In the city almshouses of the state of New York, in the same year (1871), the average number of inmates being a little more than 8,500, there were nearly 31,000 admissions, including 700 births; a monthly admission of less than 2,600, or considerably less than one third of the average number supported. Hence it would appear that the pauper class in Ireland is more numerous, in proportion to the average number supported, than it is in the cities of New York, Albany, Buffalo, &c. But while pauperism in New York is gaining ground, it is decreasing in Ireland. In Scotland it has been somewhat increasing, and its cost had advanced at such a rate for some years previous to 1870 as to occasion serious apprehensions, and lead to some important changes in the poor laws of that country. This increase of cost in Scotland seems to be partly due to the fact that there are not in workhouses all the poor who ought to be maintained indoors, and consequently that outdoor relief is carried further than it ought to be. Thus, in the year 1872, while the average number of the adult poor was 74,635, with 42,175 dependents, the whole number of indoor poor in winter was but little more than 8,000, and in summer 1,000 less; so that only about one tenth of the adult poor of Scotland are supported in workhouses or poorhouses, unless we reckon the lunatic poor in asylums, which would make the proportion of indoor poor perhaps one fifth of the whole. In England, reckoning in the lunatic poor, the indoor paupers number about one fifth of the whole, but in Ireland they are almost four fifths. Thus, in 1872, out of 296,256 Irish paupers relieved during the year, no less than 232,236 were maintained in workhouses, and only 63,432 received outdoor relief. In the United States the proportion of indoor paupers to the whole number is about half way between that of Ireland and that of Scotland. In France, outdoor relief, or, as it is there more properly called, "aid to families" (*secours à domicile*), is the favorite form of public charity, and has been extended of late years to certain classes of the poor never before aided in this way. For example, instead of supporting foundling children in hospitals, as formerly, they are now put out to nurse in the country, or are left with their mothers (*filles-mères*), who receive outdoor relief and nurse their own infants. On Jan. 1, 1861, out of 94,418 infants supported by the public, 44,176, or nearly half, were entered as foundlings, and only 14,228 as aided at home; but on Jan. 1, 1871, of an almost equal number of infants (94,043), only 10,056 were classed as foundlings, while 30,894 were aided at home. More than nine tenths of the other infants who are received into hospitals, infirmaries, &c., are immediately boarded out in the country (in 1872, 59,623 out of 63,149), and the money paid for them is practically outdoor relief. This amounts to more than 7,500,000 francs in a year, besides 2,750,000 francs paid for infants with their mothers, &c.; so that, of 10,750,696 francs paid in 1871 for these infants, all but about 500,000 francs went in the form of "aid to families" or outdoor relief. The great majority of adult paupers in France are also aided in the same way, by the local boards of relief (*bureaux de bienfaisance*). The 46 almshouses in France cost in 1872 less than 1,000,000 francs, and supported 5,470 persons; and the 12,867 boards of relief expended 26,719,000, and gave nominal aid to 1,347,386 persons. Many of these persons were undoubtedly aided twice, thrice, or oftener, during the year, but the whole number of different persons aided was probably more than 1,000,000, including the infants above mentioned. In 1840, when France had a population of 34,100,000, against 36,102,000 in 1871, the number of paupers aided by the bureaux was (nominally) 814,584, and the amount expended for them was 11,774,231 francs, or less than half what was paid in 1871. On Dec. 31, 1841, the number of paupers receiving outdoor relief in Paris was 62,705, and the amount expended in that city during the year for aid of this kind was 1,419,759 francs. Assuming that the average number during the year was 50,000, this would make the average cost of each person a little less than 30 francs. At this rate the average number receiving outdoor relief in France in 1841 would have been something above 400,000 persons; in 1871 it was probably 750,000 persons. The average number of indoor paupers in France is hard to estimate from the official returns, but in 1871 it no doubt exceeded 150,000 persons. Thus there were more than 27,000 pauper lunatics, probably more than 75,000 sick and infirm paupers in hospitals and infirmaries, and more than 40,000 neglected children. The practice in France is to give indoor (full) support only to the insane, the sick, the old and infirm, and helpless children; but the number and yearly cost of these classes is very considerable, perhaps three fifths as great, in proportion to the population, as the number and cost of the indoor poor of all classes in Great Britain and Ireland. The cost of indoor support in France also is greater than that of outdoor relief, even after the changes of late years. The system of indoor and outdoor relief established throughout the portion of the Austrian empire mentioned above is very effective. The *Armeninstituten* deal with all forms of distress, and minister to it intelligently. In 1845 they numbered 5,165; in 1866, 6,678; and in the latter year they distributed 2,577,563 Austrian florins in outdoor relief. In the same year 1,115,155 florins were expended for foundling children boarded out, making the total of outdoor relief 3,692,718 florins. The indoor maintenance reported for the same year was something more than 6,000,000 florins. In the kingdom of Prussia a little more than one third of the sum expended for the poor goes for indoor maintenance, and nearly two thirds for outdoor relief, but the cost of both kinds of relief is small compared with what is paid in France, England, and the United States. The number of indoor poor in Prussia averages less than 50,000, and has been reduced of late years by the practice of boarding out pauper children. In Norway the number fully supported is about one third of the whole public poor, who increased greatly from 1851 to 1866, but have since diminished somewhat. In 1851 there were 62,788 paupers relieved in Norway, among a population of 1,409,254, at a cost of 564,772 specie dollars; in 1855, when the population exceeded 1,500,000, there were 64,089 public poor, of whom 23,809 were fully and 40,280 partially supported, at a total cost of 682,412 specie dollars. In 1866, when the population had increased to 1,701,756, the poor numbered 84,678, or one in 20 of the population, the cost being 1,086,891 specie dollars. It is not probable that the average number of the poor was more than 50,000, if so many. In Sweden, in 1865, with a population of 4,114,141, there were 55,187 paupers fully supported in the course of the year, and 92,601 partially—in all, 147,788 paupers relieved, at a reported cost of about 3,857,000 rix dollars, or 960,000 specie dollars; but in 1870 the reported cost had gone up to 6,022,845 rix dollars, and was still below the truth. The whole number of the Swedish poor reported in 1870 was 158,436, of whom a little less than two fifths were fully supported for some part of the year. The number of almshouses in Sweden is about 2,150, and the average number of the poor cannot exceed 100,000. Italy, which is struggling toward a methodical system of dealing with its paupers (variously estimated at from 305,000 to 1,500,000 in a population of 27,000,000), furnishes no statistics of any value; and the same may be said of Spain, Portugal, Russia, Turkey, and Greece. —On the whole, it appears that the method of outdoor relief, systematically applied under strict supervision, is extending in most parts of the world. It is the method pursued in the Rhenish city of Elberfeld since 1852, where pauperism has been remarkably diminished by its application. It is also the method most favored in Massachusetts of late years, and the judicious extension of outdoor relief under the supervision of state officers or of well organized municipal boards has been one of the measures which in Massachusetts have prevented pauperism from keeping pace with the increase in population since 1865. Relief thus administered sometimes increases the cost of the poor to the public, but it is more likely to diminish their numbers and to make them self-supporting than the strict workhouse system of indoor relief. The two methods, however, should be combined in every populous community, and in great cities it is almost impossible to prevent the abuse of outdoor relief. More injurious than these abuses, or those of the indoor administration of pauper establishments, are the evils which flow from indiscriminate and competing distributions of charity by individuals and benevolent organizations. These organizations should be made to coöperate when possible with the dispensers of public relief.—*Pauperism in the United States.* In the United States, as has been mentioned, pauperism has somewhat increased; but our statistics are not so complete as to show this clearly, either as to the extent or the causes of increase. Nor is it by any means certain that pauperism has gained faster than population in any of the states, only a few of which make such returns of the number and cost of their poor as can be trusted, or used in comparisons from one period to another. The decennial census is very imperfect in its statistics on this subject, and the census tables of 1870 undoubtedly underrate the pauperism then existing in the United States. According to these figures, the average number of the poor in a population of 38,558,371 was but 116,102 on June 1, 1870—about the same as in Scotland with a population less than one tenth as great. In fact, the states of New York and Pennsylvania alone probably contain as many paupers as Scotland, and certainly pay as much in a year for their maintenance. In Pennsylvania, at a given date during 1874, the number of the poor supported and relieved, including orphan children, was about 25,000, and they cost during the year about $1,500,000. In New York the number supported or relieved at a given date exceeded 50,000, and they cost during the year not less than $4,250,000, including the appropriations of public money made to orphan homes, hospitals, and dispensaries, the support of the pauper insane in hospitals, and the expenditures for immigrant paupers under the commissioners of emigration. We thus find in New York and Pennsylvania an outlay for the poor in 1874 amounting to $5,750,000, or somewhat more than £1,000,000, which has been the extreme limit of pauper expenses in Scotland. The sum reported in 1870 as the pauper cost of the whole United States, according to the census bureau, was $10,930,429, of which three states—New York, Pennsylvania, and Massachusetts—are reported as expending nearly one half ($5,039,018) in supporting less than 50,000 paupers through the year. The tables of the census of 1860 are still more faulty; indeed, a just exhibit of pauperism in this country has never been made. At its settlement, and for a century afterward, there were but few paupers, who were relieved under some modification of the English statutes, and with no great outlay or system. Since the tide of foreign immigration set in, early in the present century, and especially since the Irish famine of 1846, pauperism has rapidly increased in the northern and middle states, more than half of all their poor being now recent immigrants, or their children or grandchildren. This influx of foreign paupers has led to many changes in our local systems of poor laws and their administration, and greatly increased our pauper expenses. In New England the town overseers of the poor, and in the other states the county supervisors, overseers, guardians, &c., look after the relief of the poor, while the state usually provides for the indigent insane, and in Massachusetts, Rhode Island, and some other states, for certain classes of the sane poor. The number of the poor decreased during the civil war, but has since increased, while the cost of supporting them is double what it was before 1860. The laws of "settlement" have been relaxed in New England and several other states, and the classification of the poor is much better attended to than formerly. The three populous states of Massachusetts, New York, and Pennsylvania, with the little state of Rhode Island, have taken the lead in this classification, and these four states expend much more in proportion to their population (now about 10,000,000) than the rest of the country. We have tolerably exact annual returns from them, and from Michigan, Illinois, and Wisconsin. Massachusetts in the year 1874 expended for the support, relief, and supervision of her poor nearly $1,500,000; the average number of the indoor poor was 6,000, of the outdoor poor 10,500, and of the casual poor, vagrants, &c., about 500, making an average of 17,000 poor of all classes, or something more than one in every 100 of the population, which in 1874 was less than 1,700,000. The whole number of different persons receiving relief was probably less than 75,000. Of the sum expended, something more than two thirds ($1,000,000) was paid by the 342 towns and cities of Massachusetts, each relieving its own poor, and nearly one third ($450,000) was paid from the state treasury. Of the latter sum, $100,000 was an extraordinary expense for the smallpox cases of 1872–'3. Of the 17,000 poor constantly on the register, not less than 2,000 were insane. The cost of the indoor poor was about $900,000, and of the outdoor or partially supported poor about $550,000, including in both cases the cost of supervision. The indoor poor of the state of New York cost in 1874 about $3,250,000, and the outdoor poor about $1,000,000. The indoor poor of Pennsylvania cost in 1874 about $1,170,000, and the outdoor poor $330,000. Of the indoor poor, who averaged nearly 10,000, about 3,100 were pauper lunatics; the outdoor poor seem to have averaged something more than 12,000, among whom were a few insane. The city of Philadelphia, with a population of more than 700,000, expended but about $120,000 for outdoor relief, and less than $500,000 for its poor of all classes. The pauper expenditure of the city of New York is difficult to ascertain and classify, but including the expenses of the emigrant commissioners, it must have exceeded $1,500,000 in 1874, of which less than $250,000 was for outdoor relief. The city board of charities expended in outdoor relief less than $150,000, yet the nominal number of its outdoor sick during 1874 was 83,309, who were attended by 30 physicians. The number of indoor sick cared for by this board in the same year was 14,987, of whom only 4,160 were residents of New York. The average cost of the indoor patients per week was $2 23, of the outdoor patients 27 cents. The whole outlay by this board for patients of both classes was $206,980. Outdoor relief in the city of New Haven, Conn., cost $1,000 a week during the winter of 1874–'5, while the whole cost of both indoor and outdoor relief at Worcester, Mass., in the same winter, was less than $400 a week, the population of the two cities being about the same. In the state of Rhode Island the cost of supporting about 900 indoor poor in 1874 was $105,000, about half of them being in 28 town almshouses, and the rest in state establishments; the cost of outdoor relief is not reported, but in 1873 it exceeded $42,000; so that the whole pauper expenditure of Rhode Island may be estimated at $150,000 in a population of 230,000. In all New England, with a population of something more than 3,500,000 in 1874, the pauper expenditure was probably less than $3,000,000, while the average number of the poor may have been 30,000. The indoor poor, including the pauper insane, averaged about half this number, or 15,000. The number of town, city, and county almshouses in New England is nearly 600, and there are two state almshouses, in Massachusetts and Rhode Island. In the state of New York there are 56 county poorhouses and six city almshouses; in Pennsylvania, 58 county and district almshouses; in Michigan, 45 county poorhouses, with an average population in 1874 of 1,642. The outdoor poor of Michigan numbered 25,862, and their cost was $183,339; the cost of the indoor poor was $266,832, including $89,258 paid for the indigent insane (about 370 in number); the whole cost of the poor in Michigan was about $460,000, for an apparent average number of 4,500. The whole pauper expenditure in the United States for 1874 may be estimated at $15,000,000, and the average number of the poor relieved at 225,000. Outside of New England the indoor poor are generally maintained in county almshouses, or in lunatic asylums and orphan homes; but less than half the states have a regular system of providing for their poor and obtaining a report of their condition, their management being generally left to the local authorities. In eight states, however (Massachusetts, Rhode Island, Connecticut, New York, Pennsylvania, Michigan, Illinois, and Wisconsin), there are boards of public charity which supervise and report the expenditure for the relief of the poor, and concert measures for the repression and prevention of pauperism. In the city of New York there is a similar board. At conferences of these boards, called by the American social science association, in New York (May, 1874) and Detroit (May, 1875), measures were taken to report more accurately the circumstances of pauperism in the United States. Comparing the administration of relief to the poor as it exists in this country with what is practised in Europe, we perceive here the same tendency to centralization so prevalent in Great Britain and on the continent. The boards of public charity in the city and state of New York, in Pennsylvania, Massachusetts, Michigan, Illinois, and other states, are in fact poor-law boards with somewhat of the power and functions exercised by the English poor-law board. Much yet remains to be done in this direction, however. The great present need is to effect a practical coöperation between the managers of official and of private charity. In New York, in Boston, and doubtless in many other cities, there are bureaus of charity which undertake to connect the official with the private distribution of alms, so that all the indigent may be judiciously aided. These arrangements are recent and tentative, but they succeed better year by year. That which our economists praise as the most deserving of imitation was adopted at Elberfeld in Westphalia; it embraces a careful system of house-to-house visitation among the city poor, who are then aided with the public money or by private contributions under official management. This system has also been partially adopted in Geneva, Switzerland. Could our American cities put in practice the same perfect system of registration and visitation before distributing public or private alms, the cost of relieving and preventing pauperism would be greatly reduced, and the truly needy would be sure of assistance.—See *Codex Thedosianus*, ix., xi., 15–16; Sir Matthew Hale, "Discourse touching Provision for the

Poor" (London, 1673); Sir Josiah Child, "New Discourse of Trade" (1690); Defoe, "Giving Alms no Charity" (1704); Dr. R. Burn, "The History of the Poor Laws" (1764); Sir F. M. Eden, "The State of the Poor, or History of the Laboring Classes in England from the Conquest" (1797); "Collections relative to the Systematic Relief of the Poor" (1815); Duchâtel, *Sur la charité* (Paris, 1827); C. de Brouckère, *La charité et l'assistance publique* (Brussels); Frégier, *Des classes dangereuses de la population dans les grandes villes* (Paris, 1840); Moreau, *Du problème de la misère et de sa solution* (1851); Chastel, *Études historiques sur l'influence de la charité* (1853); Sir George Nicholl, "Histories of the English, Scotch, and Irish Poor Laws" (London, 1854–'6); Stephen Colwell, "Themes for the Protestant Clergy, by a Layman" (Philadelphia, 1851); Lecky, "History of European Morals," vol. ii. (London, 1869); the work of Emminghaus mentioned above, and official reports.

PAUSANIAS, a Spartan general, son of Cleombrotus and nephew of Leonidas, of the Agid branch of the royal family, died about 468 B. C. He succeeded his father as guardian of the young king Plistarchus, son of Leonidas, and retained that office until his death. He was leader of the combined forces of the Greeks in the battle at Platæa, 479 B. C., and in 478 was commander of the fleet which sailed against Cyprus, and restored to freedom most of the cities of that island, and then reduced Byzantium. After the battle of Platæa Pausanias had besieged Thebes, and having obtained possession of Timagenidas, a leader of the Medizing faction, had carried him to Corinth and put him to death without trial. In the tripod dedicated at Delphi by the victorious Greeks, he styled himself alone as the leader of the Greeks and destroyer of the Persians; which inscription the Lacedæmonians subsequently replaced by the names of the confederate nations engaged in the battle. On the capture of Byzantium he connived at the escape of the Persian prisoners, who carried a letter to Xerxes offering to bring under his dominion Sparta and the rest of Greece, and demanding in return the hand of his daughter in marriage. The Persian monarch promised to furnish as much money and as many men as would be needed, and sent Artabazus to treat with him. Pausanias now assumed the Persian dress, imitated the luxurious conduct of the Persian chiefs, and journeyed through Thrace with a body of Persian and Egyptian guards. His treasonable course at length came to the ears of the Spartans, and he was recalled and placed on trial, but there was no evidence to convict him. Under pretence of taking part in the war, he sailed to Byzantium, and, resuming his correspondence with Artabazus, so conducted himself that the Athenians expelled him from the city. He retired to Colonnæ in Troas, where he continued his communications with the Persians, until he received a peremptory order from Sparta to return. Upon his arrival he was imprisoned, but released on his demand for trial. As nothing serious could be proved, he remained at liberty, and to carry out his designs tampered with the helots, to whom he offered freedom and the rights of citizenship. Although some of the helots divulged the plot, the ephors feared to take decisive measures against him. At length a slave intrusted with a letter to Artabazus, having noticed that none of the previous messengers had come back, broke the seal and discovered that he was to be put to death. He showed the letter to the ephors, and by their direction took refuge in the temple of Neptune at Tænarus. There two of the ephors hid themselves, and heard the conversation of Pausanias with his slave, which left no doubt of his guilt. As he was about to be arrested he fled to the temple of Athena Chalciœcus, where he was walled in, his own mother being said to have laid one of the first stones for this purpose. He was carried out as he was dying, to save the temple from pollution. He left three sons, of whom Plistoanax became one of the kings of Sparta.

PAUSANIAS, a Greek topographer, supposed to have been born in Lydia. He was engaged on a part of his work in the time of Antoninus Pius, whose reign began in A. D. 138, and wrote his 8th book during the latter part of the reign of Marcus Aurelius, which closed in 180. His work, entitled Τῆς Ἑλλάδος Περιήγησις, "Itinerary of Greece," is divided into 10 books, and comprises minute descriptions of the whole of the Peloponnesus and of the most interesting parts of Hellas proper. It is largely devoted to monuments, edifices, local legends, and physical peculiarities, and is obviously the fruit of close personal examination. The first edition, which was exceedingly incorrect, was printed by Aldus at Venice (fol., 1516). The latest editions are those of Schubart and Walz (3 vols. 8vo, Leipsic, 1838–'40; new ed., 1857–'66), and of Dindorf (Paris, 1845). There is an English translation by Thomas Taylor (3 vols. 8vo, London, 1793–'4).

PAUSIAS, a Greek painter, of Sicyon, who flourished between 360 and 330 B. C. He was instructed by Pamphilus. Pliny says that he was particularly distinguished as a painter in encaustic with the *cestrum*, and he is believed to have been the first to decorate the ceilings and walls of houses in this style. He was fond of painting small pictures of boys, and from his intimacy with Glycera, a flower girl, he acquired great skill in flower painting. A celebrated painting by him, representing a sacrifice, was preserved in the portico of Pompey at Rome.

PAUTHIER, Jean Pierre Guillaume, a French sinologue, born in Besançon, Oct. 4, 1801. His principal works are: *Description historique et géographique de la Chine* (2 vols., Paris, 1837–'53); *Quatre livres de philosophie morale et politique des Chinois* (1841; 4th ed., 1852); *Les livres sacrés de toutes les religions, sauf la*

Bible (2 vols. 8vo, 1858); *L'Inscription syro-chinoise de Si-ngan-fou* (8vo, 1858), the Chinese text with figured pronunciation, a Latin literal version, and a French translation of the inscription and the Chinese commentaries; an edition of Marco Polo's travels as dictated by himself in French, from three inedited manuscripts in the national library, with notes and a commentary from Chinese sources (2 vols. large 8vo, 1865); and *Dictionnaire étymologique chinois-annamite-latin-français* (in 12 numbers, of which the first appeared in 1867). He has translated Byron's "Childe Harold," and published several volumes of poetry, and in 1863 a work on the Ionian islands during the French occupation and the English protectorate. Pauthier's works are much esteemed, and some have had several editions.

PAUW, Cornelis de, a Dutch historian, born in Amsterdam in 1739, died at Xanten, near Cleves, July 7, 1799. He was educated at Göttingen, and became canon of Xanten and afterward reader to Frederick II. of Prussia. He wrote in French *Recherches sur les Américains* (8vo, Berlin, 1769), designed to prove "the native inferiority of the savage Americans;" *Recherches sur les Égyptiens et les Chinois* (2 vols. 8vo, 1774; translated into English by Capt. J. Thomson, London, 1795), designed to prove "that no two nations ever resembled each other less than the Egyptians and the Chinese;" and *Recherches sur les Grecs* (2 vols. 8vo, 1788; translated into English, London, 1793). In consequence of the invasion of the duchy of Cleves by the French revolutionary army, Pauw became melancholy, and burned his *Recherches sur les Germains.*

PAUWELS, Ferdinand, a Belgian painter, born at Eckeren, near Antwerp, April 13, 1830. He studied at Antwerp and under Wappers, and exhibited in 1851 his "Meeting of Baldwin I. with his daughter Joan at Constantinople in 1206." His picture of Coriolanus, partly completed in 1852, obtained for him a stipend which enabled him to reside in Rome till 1857. While there he painted Old Testament subjects and legends of the saints. In 1860 appeared his "Widow of Jacob van Artevelde." His "Banished by Alva" (1861) obtained for him in 1862 a professorship at Weimar, which he filled till April, 1872, when he returned to Antwerp. His works produced subsequent to 1862 include "The Return to Antwerp of the Parties who had been banished by Alva," and "The Reception by Louis XIV. of a Deputation from the Doge of Genoa" (1864); "Negotiations of Citizens of Ghent with Philip the Bold in 1388 for the surrender of that city" (1865); "Queen Philippa of England relieving the Poor of Ghent" (1866); and "Hans Pleinhorn, a Merchant of Nuremberg, surprised with his Family while engaged in Protestant Worship, by Spanish-Roman Catholic Detectives" (1868). He has been lately employed in painting "The Youth of Luther" as one of the frescoes for the Wartburg.

PAVEMENT (Lat. *pavimentum*, from *pavire*, to beat or ram down), a covering of stone or other hard material for roads, walks, and floors of houses. The earliest mention of paved highways is of those prepared by Semiramis, according to the inscription which she set up, recorded by Valerius Maximus. Isidorus says the Carthaginians had the first paved roads. The streets of Rome were not paved in the time of its kings, but the Appian way was constructed by Appius Claudius 200 years after their expulsion, and many of the streets are known to have been paved with stone in the 4th and 5th centuries after the building of the city. Pavements of blocks of lava worn into ruts by the wheels of carriages are met with in Herculaneum and Pompeii. From the descriptions of pavements given by Vitruvius, together with the poem of Statius on the Via Domitiana and the fragments of ancient paving still remaining, a very clear idea may be formed of the care given by the Romans to the construction of their famous roads. These were laid out with a width of from 8 to 15 ft. by excavating a shallow trench along each side. The space between these was then dug down to a solid bed, or if this could not be reached piles were driven to support the materials of the road. The lowest course was of broken stones, none smaller than the fist; over these was a course 9 in. thick of rubble work, or broken stones cemented with lime, well rammed; over this was a course 6 in. thick of finer materials, chiefly broken bricks and pieces of pottery, also cemented with lime; and upon this was laid the *pavimentum*, which consisted of large polygonal blocks of the hardest silicious stones, sometimes of basaltic lava, of irregular form and nicely fitted together in a sort of mosaic. In the cities the slabs of stone were sometimes rectangular and of softer material, as in the forum of Trajan, which was paved with travertine. In every instance great care was taken to fit the stones to each other so as to produce a perfectly even surface. The floors of Roman houses were paved with pieces of bricks, tiles, stones, &c.; sometimes with tiles ground to powder and mixed in with mortar; and again with pieces of marble imbedded in a cement ground, and well beaten or rammed down, whence the name *pavimentum.* Mosaic pavements were first made in the time of Sulla, by whom, according to Pliny, one was constructed in the temple of Fortune at Præneste. They became very common in the houses of Pompeii, and were there produced with great taste in a variety of beautiful patterns, in marble of different colors, in tiles, and even glass, set in a fine cement and laid upon a deep bed of mortar. Some of the designs were of figures and scenes in actual life, being really pictures in mosaic. An account was presented to the British association in 1850, by Prof. Buckman, of an ancient Roman pavement discovered at Cirencester, in which appeared a medallion of Flora with a head dress and flowers of verdigris green when first uncovered. This being scraped off, the portion of the pavement beneath was found to be a beautiful ruby glass, the color of which was derived from peroxide of copper, and this by decomposition had become converted externally into the green carbonate of copper.—Though the paved roads of the ancient Romans surpass all other structures of the kind that have been made by civilized nations since their time, there are found in Peru remains of works of a similar kind of unknown age, and exceeding them in grandeur and extent. Such were the great roads from Quito to Cuzco, and continued south toward Chili, laid out through mountainous and almost impassable regions for distances variously estimated from 1,500 to 2,000 m., and about 20 ft. in breadth. They were built of heavy flags of freestone, and in some parts covered with a bituminous cement, which time has made harder than the stone itself. In Mexico, among the ruins of Palenque, are also found pavements of large square blocks of stone constructed with great skill and nicety.—In Europe during the middle ages comparatively little attention was given to the paving of streets and roads. Cordova in Spain was paved in 850 by Abderrahman II. Streets in Paris were first paved in 1184 by Philip Augustus. In 1832, in excavating for a sewer in the rue St. Denis, this ancient pavement was met with, and a little below this the still more ancient roadway of gravel of the period of the Roman emperors. There were a few paved streets in England before the time of Henry VII. London was first paved in 1533, but many streets continued in a perilous condition by reason of deep pits and sloughs through the whole of the 16th and 17th centuries. Holborn was paved by royal command in 1417; but the great market of Smithfield remained without pavement 200 years longer.—In modern times various methods and materials of paving have been employed. In Holland all the streets are paved with bricks, which are also used for the same purpose in Venice. They obviously lack the strength and durability required for the passage over them of heavy loads. In other cities, instead of the broad flat stones used by the Romans, rounded pebbles called cobble stones, found among the gravel of the diluvium or along sea and river beaches, have been very generally used. These, when of hard stone, closely set, and well rammed down in a bed of gravel and sand, form an economical and very durable pavement, which gives secure footing to horses and is easily repaired. Blocks of wood have been at times in some repute, but they have proved objectionable on account of soon becoming slippery, particularly when wet, and also of their tendency to decay. They were commonly cut in hexagonal prisms and set upright, so that the wear came across the ends of the grain. Hemlock, being cheap, was usually selected for the purpose in America, where however this form of pavement has been generally abandoned. A part of Broadway, New York, between Chambers and Warren streets, was laid with hexagonal wooden pavement in 1835. Different foundations were tried, such as cobble stones, flagging, and macadam. The surface was coated with tar and gravel. The Nicolson pavement was introduced into Boston in 1848, and was among the first wooden pavements extensively used. It consists of a foundation of hemlock, spruce, or pine boards, laid flat upon the ground, upon which blocks of similar wood or of chestnut, from 4 to 6 in. long and wide, and from 2 to 8 in. thick, are set with the grain vertical. Between the blocks, running across the street, inch boards are set on edge, the upper edge being a little below the surface of the blocks, and the grooves so formed are filled with coarse gravel. The blocks are either soaked in melted asphalt, or the hot material is turned over the whole and made to fill the interstices. If the blocks and foundation boards were thoroughly kyanized and boiled in the asphalt till saturated, the pavement would undoubtedly be rendered very durable, especially if a foundation of concrete were first laid. There are other forms of wooden pavement which are held in place by an ingenious locking together, and answer a good purpose as long as the material resists decay. Kyanizing and proper saturating with coal tar or asphalt can always be applied to these pavements; and conscientious attention to preparing a proper foundation will secure satisfactory results. It may be remarked that honesty in the performance of contracts for paving is an element without which no pavement can be expected to have a reasonable degree of permanence.—The pavements most common in Europe are ashlar, macadam, concrete both hydraulic and bituminous, and Neufchâtel and other asphalt pavements. The common ashlar is composed of square blocks of stone, usually granite, about 12 in. deep and 10 or 12 in. long, by 5 to 7 in. wide. A pavement of granite similar to this, though not quite so deep, was some years ago placed in Broadway, New York, called Russ pavement. It proved impracticable on account of slipperiness, and after various attempts to overcome this by cutting grooves, it was replaced by one made of thinner stones, called the Guidet pavement. In this the stones are 6 or 8 in. deep, and about 12 in. long by 4 in. wide. They are set on edge, and in wearing do not form large smooth surfaces like the ashlar or Russ, and consequently afford greater protection against the horses' slipping. If they were laid upon a concrete foundation, the pavement would not need resetting as often as when laid upon common gravel and sand. This pavement is now extensively used for the main thoroughfares of cities. Many streets of New York and other American cities have the so-called Belgian pavement, consisting of small cubical blocks, generally of trap rock, which has proved very durable. Cobble-stone pavement has been much used in many cities of the

United States, and when made of stones of nearly equal size and 4 or 5 in. in diameter, laid upon a good bed of gravel and sand, makes a very good pavement for a few years. The ease and cheapness with which it may be repaired cause it to be retained in many localities where cobble stones can be easily procured; but the jolting and noise of vehicles driven over it make it objectionable for streets having much traffic.—The early stone roads in France were formed of beds of flat stones covered with broken stones, large below and smaller above. About 1760 Trésaguet discarded the flat stones except on marshy ground, and substituted stone blocks on an arched bed. This method continued till the early part of the present century, when the large stones of Trésaguet were replaced by a crust of small broken stones laid directly on the ground. In 1816–'19 Macadam made many roads of this kind in England, and his success caused his name to be given to the system. The roads made by him were however inferior to those made in France by the same process. He disregarded too much the nature of the soil, and the defects which followed resulted in the advocacy by Telford of a return to the use of large stones at the bottom on soft ground. Flagging is sometimes laid in connection with macadamized pavement in rows far enough apart to support the wheels of carriages, by which the cutting of the road into ruts is avoided, while the coating of pounded stone need not be so great. Such a road may be seen on parts of the old turnpike between Albany and Schenectady, N. Y.—Within a few years increased attention has been given to the construction of asphalt pavements, particularly in France, and when they are properly laid upon a solid concrete foundation (and they ought to be laid upon no other) they probably form the best roadway that can be constructed. Pavements called asphalt had been laid down in different places in Europe and America, but they did not answer the purpose of either a roadway or sidewalk. They were chiefly a sort of asphalt concrete, made by simply mixing melted bitumen with coarse gravel or pounded stones. The more volatile portions of the bitumen being retained, they would gradually pass away, and a crumbling of the road bed would be the final result, preceded during the summer months by the formation of a "poultice." But more attention having been paid to the conditions in which the bitumen is used, a decided advance has been made, and to a greater extent in France than elsewhere. A very good pavement can be made by raising the bitumen to 250° or 300° to expel the volatile portions, and using the residue to fill voids in coarse gravel or broken stone; but a better material is now used in Europe, and also introduced into the United States, in the form of an asphaltic limestone found in the Val de Travers in Switzerland, and exported from Neufchâtel, and known as Seyssel or Neufchâtel asphaltic rock. A good substitute is also made in the United States by mixing such minerals as grahamite or albertite with Trinidad asphalt, and combining this with calcareous sand or similar material. The Seyssel rock is a native limestone, composed of pure carbonate of lime impregnated more or less with bitumen, generally containing from 92 to 93 per cent. of limestone and 7 to 8 per cent. of bitumen. Less pure varieties are found in the volcanic region of Auvergne, and contain clay, silica, magnesia, iron, &c. The Seyssel rock has a fine-grained irregular fracture, with a sonorous sound like ordinary limestone at common temperatures; but at 120° F. it may be flattened; at 160° it begins to crumble, and at 212° the disintegration is complete. Its average specific gravity is 2·235. In Paris this rock is used in two forms: in an unmixed or pure condition for road beds of streets, and mingled with bitumen in different proportions for sidewalks and parks, the artificial bituminous mixture being called "mastic of asphalt," while the unmixed rock is called "asphalt." When it contains less than 6 per cent. of bitumen, it is not regarded as fit to be worked. The road bed is formed by beating the earth compactly, care being taken to insure good drainage. A concrete of gravel or broken stone in a matrix of hydraulic cement is then laid from 4 to 8 in. or even more in thickness, depending on the nature of the ground, and is allowed to set and become dry upon the surface. Upon this the prepared asphalt is spread. The rock is crushed by being first broken into pieces, then passed between rollers armed with strong teeth, and afterward between smooth cylinders; it is then roasted in shallow sheet-iron pans, or in revolving cylinders. It is at first heated to 160° or a little upward until it begins to crumble, and then raised to 250° or 300°, the operation requiring about an hour and a half. The concrete bed must be dry before the asphalt is laid upon it, for if not steam will be formed and prevent the consolidation of the material. The drying may be hastened by covering with hot ashes or hydraulic lime. The asphalt, which the heat has reduced to the form of a powder, is then spread uniformly over the surface of the concrete bed to the thickness of 2 or 2½ in., so that when compacted it will be from 1½ to 2 in. thick. The packing is principally done by hand, with hot iron pestles, raised nearly to redness. A coat of dry sifted powder is then spread over to fill up inequalities of surface, and a flat iron heated nearly to redness is passed over the whole. Rollers weighing from 500 lbs. to a ton and a half are often used, in conjunction with the hand packing, but their utility in increasing the solidity is doubtful. After the packing has been completed the road may be opened in a few hours for vehicles of all kinds. The grahamite asphalt pavement company of New York make a substitute for the Seyssel rock by combining about 20 per cent. of asphalt mixture with 80 per cent. of calcareous sand, which should contain at least 20 per cent. of carbonate of lime. The asphalt mixture is composed of varying proportions, depending on location and climate, of Trinidad asphalt and grahamite, a firm conchoidal fracturing carbonaceous mineral found in large quantities in West Virginia, and first accurately described and named by Prof. Henry Wurtz. From samples that have been laid in some of the streets of New York it may be expected that this will make a good road pavement when laid upon a good concrete foundation. It should be a well recognized rule that no asphalt road shall ever be attempted or allowed to be laid without the road bed being first covered with a layer of hydraulic concrete sufficiently thick to withstand the pressure of the heaviest carts and drays.

PAVIA. I. A N. province of Italy, in Lombardy, comprising the districts of Pavia, Bobbio, Lomellina, and Voghera; area, 1,292 sq. m.; pop. in 1872, 448,435. It is watered by the Po, the Ticino, and the Olona, and the canals of Bereguardo and Pavia and the Naviglio Grande pass through it. The country is generally level, and the soil fertile. Much attention is paid to the raising of silk and the breeding of cattle, and much of the cheese called Parmesan is made here. There are no manufactures of importance. The climate is not very healthy. **II.** A city (anc. *Ticinum*), capital of the province, on an eminence on the left bank of the Ticino, near its confluence with the Po, 19 m. S. by W. of Milan; pop. in 1872, 29,618. It is about one mile in extent each way, and is surrounded by an old wall. A communication with the suburb on the other side of the river is made by a covered bridge of eight arches built in 1351. From this bridge the principal thoroughfare extends through the city. Pavia was at one time remarkable for the magnificence of its buildings, and for its numerous lofty square towers, designed for ornament, or used as prisons or strongholds, whence it was called "the city of a hundred towers." Of those still standing, Belcredi and Maino are each about 190 ft. high. One of the most noteworthy of the edifices now remaining is the cathedral, begun near the close of the 15th century and still unfinished, in a side chapel of which is the magnificent tomb of St. Augustine. The church of San Michele, a Lombard building, was finished during the 7th century. Santa Maria del Carmine, an immense Italian Gothic church built in the 14th century, is a remarkable specimen of the finest brickwork; and the church of San Francesco is of the same style and material. The celebrated church of San Pietro in Cielo d'Oro, which contained the tomb of Boëthius, is now mostly in ruins, and a part of it is used as a storehouse. About 4 m. N. of the city is the magnificent monastery of Certosa, founded in 1396 by Giovanni Galeazzo Visconti, the first duke of Milan, with a church having a façade which is considered the most beautiful architectural work of that age. The university of Pavia, one of the most ancient in Italy, is said to have been founded by Charlemagne in 774; but it received its greatest impulse from Galeazzo Visconti. It has a library of about 50,000 volumes, a collection of coins, a museum of anatomical preparations and of specimens of natural history, a botanic garden, and a school of the fine arts. Of the two colleges now belonging to the university, the collegio Borromeo educates about 40 students, and the collegio Ghislieri about 60; and in both the students are instructed, lodged, and fed gratuitously. The total number of students in the university is about 1,600.—Although at the end of the Roman republic Ticinum was a place of considerable importance, it is mentioned first by the geographers and historians of the empire. In A. D. 452 it was taken by Attila; but Theodoric, king of the Ostrogoths, rebuilt and fortified it, and erected a palace. During the Gothic wars it was the principal stronghold of that people in northern Italy, and there the royal treasury and valuables were kept. During the Lombard invasion it resisted for three years a siege by Alboin. Taken by him in 572, the Lombard monarchs chose it for their residence, and it remained the capital of their kingdom till 774, when

Pavia.

Desiderius, the last Lombard king, after a protracted siege, was obliged to submit to Charlemagne. It was now called Papia, afterward changed to Pavia. In the middle ages, during which a number of councils were held there, it was at one time an independent republic, at another ruled over by tyrants, and again subject to the authority of the Viscontis of Milan. It is memorable for the battle fought under its walls Feb. 24, 1525, between the French under Francis I. and the imperialists under Marshal Lannoy, in which the former were defeated and nearly destroyed, and their king was taken prisoner. In 1527 and 1528 Pavia was twice taken by the French and laid waste. In 1796 it was stormed and pillaged by Napoleon, after an insurrection in which his garrison had been expelled. It came by the peace of 1814 into the possession of Austria, and after the war of 1859 the city and province were incorporated with Sardinia.

PAVIE, Théodore Marie, a French orientalist, born in Angers, Aug. 16, 1811. He early travelled in the United States, South America, the East Indies, and China, and from 1853 to 1857 he was professor of Sanskrit at the collége de France. He has written extensively for the *Revue des Deux Mondes*, the *Bulletin* of the geographical society, and the *Journal asiatique*. His works includo *Voyage aux États-Unis et au Canada* (2 vols., 1828–'33); *Le San-Koué-tchi*, a history of the three kingdoms into which China was divided in the 13th century (2 vols., 1845–'51), and other Chinese and Sanskrit editions and translations; and many narratives of travel.

PAVY, Louis Antoine Augustin, a French theologian, born in Roanne, Loire, March 18, 1805, died in Algiers, Nov. 16, 1866. He was professor of ecclesiastical history in the faculty of Lyons from 1838 to 1843, and from 1846 till his death he was resident bishop at Algiers. Among his publications are his *Lettres sur le célibat ecclésiastique* (1851); *Du Mahométisme* (1853); *Histoire critique du culte de la Sainte Vierge en Afrique* (1858–'9); and *Œuvres* (4 vols., 1858–'64), consisting of his pastoral letters, sermons, &c.

PAWN (Lat. *pignus*), any article of personal property given in pledge, or by way of security for the payment of a debt or the discharge of an obligation. The word is also used as a verb, and signifies to give such article in pawn or in pledge. It is a bailment, because the essence of the transaction is the delivery of the pawn by the pawner to the pawnee. The first question that arises is, therefore: In what class of bailments is a pawn to be placed, in reference to the obligations of care on the part of the bailee? The answer is obvious: the bailment of pawn is a bailment for the benefit of both parties. The pawnor obtains credit or delay or other indulgence, and the pawnee obtains security. Therefore the bailee (or pawnee) is bound only to ordinary care, that is, not to the extreme care to which he would be bound if the benefit were all his own; but it is not enough if he takes the slight care of which it would discharge his duty and shield him from responsibility if the benefit were all the bailor's, the bailee himself deriving none from the transaction. Hence a pawnee is answerable for the loss of the pawn or for injury to it only when there has been an absence on his part of ordinary care, which the law defines as that care which a man of ordinary prudence would take of his own property of like kind and under similar circumstances. If therefore the pledge be lost by some intrinsic defect, the operation of which might possibly have been prevented, or by some casualty which might possibly have been avoided, or by a superior force or violence which might have been resisted, the pawnee is nevertheless not responsible, unless he was wanting in the ordinary care above described.—A pawnee has a property in the pledge, but it is special, not absolute. It is sufficient to maintain an action against a third party for injury to or abduction of the pledge; and a judgment in such an action, when brought either by the pawnor or the pawnee, would be a bar to another action brought by the other.—A pawnee has only a right to hold the pledge; therefore, if he uses it, he does so at his own peril; and if the thing be lost or injured during such use, the pawnee is responsible, although the loss occurs wholly without neglect on his part. So, too, if he derive a profit from this use, he must account for this use of it unless it was equally for the benefit of the pawnor. Thus, if the pawn be a horse, the pawnee may use it enough to preserve the health of the horse, and for this use make no compensation; but if he take a journey with the horse, he must allow the usual price. In all cases the pawnee must account for income or profits derived from the pledge; and if he is put to extraordinary expense or trouble for the benefit of the pledge, or to preserve its value, although this would be for his own benefit also, he may charge the owner and pawnor for all this, unless there be a bargain to the contrary express or implied.—From what has been said it will be seen that if the pledge be stolen, the pawnee is not liable unless there was neglect on his part; but the question is at once important and difficult as to the legal presumption of neglect or care. By the civil law, the presumption was against the pawnee; that is, if the pledge was stolen from him, he was responsible unless he could prove that there had been no neglect on his part. There are reasons for supposing that the law of England and of the United States is otherwise; and that if a pawnee can prove that the pledge was stolen from him, this will make it the loss of the owner, unless the owner can prove neglect or default on the part of the pawnee.—The distinction between a mortgage and a pledge is of very great importance. Nothing is more common now than the giving of personal property, and especially of choses in action, as promissory notes, and of stock or scrip of incorporated companies, by way of security for loans or debts. Now this giving of security may be regarded as a mortgage or as a pledge. But if it be a mortgage, the parties acquire one set of rights, and come under one set of obligations; and if it be not a mortgage, but a pledge, their rights and their obligations are very different. A pawnor retains the ownership of the pledge, but places it in the possession of the pawnee as his security; but a mortgageor transfers at once the ownership of the property, retaining only a right to annul and defeat this transfer by payment of a certain debt. (See MORTGAGE.) The practical effect of this difference, which gives to it its importance, is this. A mortgagee, who acquires the property in or the ownership of the thing mortgaged, may do with that thing whatever he may do with his own. He may sell it, or mortgage it, or keep it in his own hands, always subject however to the mortgageor's right to redeem it; and it makes no difference to the mortageor whether, when he comes to pay the debt and redeem the thing mortgaged, he finds it in one hand or another. But as a pawnee acquires no ownership whatever, he cannot sell the thing pawned, nor pledge it over, nor transfer it in any way. His whole right consists in the right of possession. He may keep the pawn as a security for his debt, because the owner has lost, not the right of property, but the right of possession; but the pawnee can do nothing else with it. Nor is this all; for he not only may, but must keep the pawn in his possession. This is his bargain with the pawnor by construction of law; and he holds the pawn only on this condition. If therefore the pawnee, for any reason or in any way, voluntarily parts with the possession of the pawn by transferring it to a third person, his lien or right of possession is at once gone; the pawnor at once recovers his right of possession, and may demand and repossess himself of the pawn, although the debt to secure which it was given remains wholly unpaid. The custom of brokers and others, who lend money or give other accommodation on the security of pledged stocks, has been the reverse of this. One holding such stock by way of security has regarded himself only as bound to have that stock ready to be returned when the debt is paid, and in the mean time he does what he pleases with it; that is, he sells it, or transfers it by way of pledge, or makes use of it as of his own. But recent decisions have declared that by such use the right of the pledgee to hold the stock is wholly lost. The pledger may therefore demand it at once, although his debt be not paid; and if it be not forthwith redelivered to him, he may have his action for damages, and in this action recover its value at the time of the demand, and perhaps (for this is not quite settled) any higher value it may have reached at any time while in the pawnee's hands. For this severe and somewhat technical rule there is this substantial reason. If a pawnee may use in this way stock pledged to him, he forces upon the pawnor the risk of his insolvency at the time when the stock should be redelivered. For if the pawnee be then insolvent, without the stock in his hands, the pawnor has only a claim against him for its value, and must take his dividend with other creditors. But if the pawnee retains in his hands the stock as the pawnor's stock, the pawnor then retakes it as his property.—A pledger may always transfer the pawn, but subject to the pawnee's claim; and if the transferee pay the debt, the pawnee must deliver the pawn to the transferee. The pawnee holds the pawn only as security, nor does it become absolutely his even if the debt be not paid at maturity. There is no forfeiture of the pawnor's right to redeem, until something has been done which is the same thing in its effect that foreclosure is in a case of mortgage. What this thing is may not be, in all cases and in all respects, quite certain. There is no doubt that the pawnee may apply to a court of equity and have a decree of sale, and may thereupon sell the pawn in compliance with the terms of the decree. Some authorities hold, or rather intimate, that this, which was the ancient and regular way, if not the only one, remains at this day the best and safest. But we are satisfied that it is not necessary, and certainly it is not usual. We consider it as now established law, that a pawnee, after the maturity of the debt, and after unsatisfied demand, may sell the pawn, provided he do so in good faith and with all reasonable precautions in favor of the pawnor's interest. There is perhaps no other way of doing this, which satisfies the law, than a sale by public auction; and at all events this is the surest and most proper way. Nor will a sale by auction be conclusive against the pawnor, unless it is conducted, as to time, place, advertisement, notice to the pawnor, and in all other respects and circumstances, in such wise as to indicate perfect good faith, and to secure a due regard to the rights of the pawnor. The proceeds must be applied to the payment of the debt. If any balance remains over, that must be given forthwith to the pawnor. If any portion of the debt remains unpaid, the pawnee has an equally valid claim to that amount as he had originally for the whole. It is not unfrequent for the parties to agree, when the pledge is made, as to what shall be done with it; as, for example, that the pawnee may, if the debt be unpaid at a certain time, sell the pawn, if it consist of stocks, at the brokers' board. But any such agreement must be complied with literally and accurately. It should be remarked, however, that negotiable bills and notes come under an exceptional rule. When they are pledged, it is said that the pledgee has much more power as to the use and disposition of them than of stocks; but this exception is not very accurately defined. So it should be said, that although delivery of possession is absolutely essential to the contract of pledge, and if the pledgee voluntarily parts with his possession he loses all lien or right to hold the pawn, this does not apply where the pawnee, in good faith, for a special reason, and for a limited time, returns the pawn to the pawnor, reserving all his rights over it. The pawnor may in that case be regarded as the agent of the pawnee, and as holding it for him. A pawnee, who takes a pawn as security for a specific debt or debts, cannot hold it as security for other debts from the pawnor, unless by a bargain between them. —Until a comparatively recent date, nothing seems to have been given in pawn, at least within the recognition of the common law, but personal chattels. But now all personal property, all choses in action, and even patent rights or copyrights, and policies of insurance, may be given either in pawn or in mortgage.

PAWNBROKER, one who lends money, at a certain rate of interest, on the security of goods deposited with him, having power to sell the goods if the principal and interest of the money lent be not repaid within a specified time. Among the first who made a business of lending money on pledges were probably Jews and the Cahorsins or Caursins. The latter are supposed by most writers to have been natives of Cahors in France, but in an edict of one of the French kings they are called foreigners. In the course of the 13th century Italian merchants from Lombardy established themselves in England and France, and afterward in the other countries of Europe. They were bankers and money lenders as well as merchants, and on account of the precariousness of credit took pledges in security for their loans. They formed powerful companies, and in time became the bankers of the kings and nobles to whom they were indebted for protection. Edward I. farmed out to them the customs of his kingdom in consideration of a loan, and Edward III. and Richard II. pawned to them their crown jewels. Lombard street in London and the rue des Lombards in Paris became financial centres, and the name Lombard the synonyme of money lender and usurer. In the 15th century efforts were made to deliver the needy from their extortions by the establishment of *monts de piété* (see MONT DE PIÉTÉ), and in 1530 the Lombards were expelled from England, and in the next century from France. The modern pawnbrokers' sign, the three golden balls, is supposed to be derived from the arms of the corporation of Lombards, or from the armorial bearings of the Medici family, who were among the wealthiest of the Lombard merchants. Pawnbrokers were first recognized in English law by the act of the first year of James I. In 1871 there were 3,540 pawnbrokers in London. By the census of 1870 there were 384 in the United States, but the actual number must have been much greater.

PAWNEE. I. A S. E. county of Nebraska, bordering on Kansas; area, 432 sq. m.; pop. in 1870, 4,171. The Atchison and Nebraska railroad crosses the N. E. corner. The surface is diversified; the soil, particularly along the streams, is fertile. The N. part is rocky, and there are quarries of limestone and beds of bituminous coal. The chief productions in 1870 were 123,249 bushels of wheat, 232,720 of Indian corn, 74,431 of oats, 39,577 of potatoes, 75,187 lbs. of butter, and 8,709 tons of hay. There were 1,642 horses, 1,660 milch cows, 2,778 other cattle, 847 sheep, and 2,615 swine. Capital, Pawnee City. **II.** A S. W. county of Kansas, intersected by the Arkansas river and its Pawnee fork; area, 900 sq. m.; pop. in 1870, 179. It is traversed by the Atchison, Topeka, and Santa Fé railroad. The surface consists of rolling prairies, with a fertile soil. Capital, Larned.

PAWNEES, a warlike tribe of American Indians, long resident in Nebraska on the Platte and its tributaries, with occasional sojourns on the Kansas. They were first heard of through the Illinois, and the name is of that language. Marquette noted several bands on his map in 1673. They have long been divided into four bands: Tsawé (Grand Pawnees), Tskitkakish or Kattahawkees (Republican Pawnees), Petowera or Tapahowerats (Tapage Pawnees), and the Skere (Pawnee Mahas or Loups). They were constantly at war with the Sioux and other nations, and, being considered irreclaimable savages, were permitted to be held as slaves in Canada when bought from other tribes; wherefore any Indian held in bondage was called a Pani. They were hostile to the Spaniards before and after the cession of Louisiana to the United States, but have always been friendly to the Americans. They lived in villages of earth-covered lodges, cultivating a little corn, beans, melons, &c., but going off regularly to the buffalo plains. They shaved the head except the scalp lock; the women were decently dressed. From time to time they sacrificed prisoners to the sun to obtain good crops, but this was finally stopped among the Skere, who continued it latest, by the courage of Petalesharoo about 1820. Among their sports was a peculiar one of hurling a javelin through a ring sent rolling along the ground. Pike in 1806 estimated the population of three villages at 6,223, with nearly 2,000 warriors, expert horsemen, with some firearms. They fought fiercely with the Tetans, Arapahoes, and Kiowas, as well as with the Sacs and Foxes. The removal of the Delawares to lands between the Platte and the Kansas led to war with that tribe, who in 1832 burned the Great Pawnee village on Republican fork. Smallpox soon after carried off a large part of the tribe. By treaty of Oct. 9, 1833, they sold lands south of the Nebraska and agreed to remain north of that river and west of Loup fork. Provision was then made for education, and they were soon possessed of comfortable houses, good farms, and schools; but all this was checked by the Sioux, who attacked them in their hunts, killing many, and finally invaded their villages, burning houses, killing and ravaging. The Pawnees were driven south of the Nebraska, and regarding this as a violation of their treaty, government stopped their annuities; their missionaries and farmers left them, cholera set in, and in three or four years they lost half their number. By treaty of Sept. 24, 1857, they sold more of their lands, but government did not protect them from the Sioux, who year after year killed and plundered them, repeatedly destroying their villages. The reservation of 288,000 acres was 105 m. west of Omaha, in the valley of the Loup fork of the Platte. In 1861 they numbered 3,414, and furnished government with an efficient company of scouts, and a still larger force to act against the Sioux during the war with that tribe. This increased the hostility of the Sioux, who after making peace with government turned again on the wretched Pawnees, slaughtering them without mercy and effectually preventing any progress or improvement. By act of June 10, 1872, 48,424 acres were sold for their benefit, and they began to think of removal, especially after their crops were swept away by the locusts. On Oct. 8, 1874, the Pawnees in general council determined to remove. They are under the charge of the Friends, and have a perpetual annuity of $30,000, with appropriations for education, farming, &c., of $22,600 more. In 1874 they had a manual labor school and a day school with 156 pupils, but their individual wealth, chiefly in horses, is very small. There is no grammar or extended vocabulary of their language.

PAWTUCKET, a town of Providence co., Rhode Island, on both sides of Pawtucket river, here navigable and spanned by a stone and three iron bridges, and on the Boston and Providence and Providence and Worcester railroads, 4 m. N. of Providence; pop. in 1870, 6,619; in 1875, 18,464. The town is beautifully situated, and has a picturesque appearance. The river here has a fall of 30 ft., supplying extensive water power. The first cotton manufactory in the country was established here by Samuel Slater in 1790, and for 40 years the place held the first rank among the manufacturing towns of the country. The principal manufactories now in operation are 11 of yarn, 2 of worsted braid, 5 of woollens, 13 of cotton cloth, 1 of wadding, 12 of thread, 2 of hair cloth, 2 of card board, 2 of paper bags, 4 of machinery, 1 of bolts, 3 of files, 1 of tacks, 1 of brooms, 1 of chemicals, 1 of brushes, 1 of screws, 1 of gas, 3 of boots and shoes, 1 of manufacturers' supplies, 7 of belting, 3 of thread spools, 1 of furniture, 2 of steam fire engines, 2 of sash and blinds, 1 cloth and 2 yarn printing establishments, 2 brass founderies, 1 stove and 3 iron founderies, 2 bleacheries, and 8 tanning and currying establishments. From five to ten vessels, laden with coal and lumber, arrive daily during the season of navigation. The assessed value of property in 1874 was $16,356,629. The town has a paid fire department, three national banks, three savings institutions, an insurance company, 14 public schools including a high school, a public library, two weekly newspapers, and 18 churches, viz.: 4 Baptist, 2 Congregational, 4 Episcopal, 3 Methodist, 3 Roman Catholic, 1 Swedenborgian, and 1 Universalist.—Pawtucket formed part of Bristol co., Mass., till 1861. A portion of the town of North Providence was annexed to it in 1874.

PAX (Lat., peace), an instrument anciently used in the Roman Catholic church, and retained for some time in the church of England. In the early ages of Christianity it was customary for the faithful at certain parts of the divine service to practise literally St. Paul's recommendation, "Greet ye one another with a holy kiss," as appears from the "Apostolical Constitutions" (viii. 11): "Let the bishop salute the church and say, 'The peace of God be with you all;' and let the people answer, 'And with thy spirit.' Then let the deacon say to all, 'Salute one another with a holy kiss;' and let the clergy kiss the bishop, and the laymen the laymen, and the women the women." But in course of time, when the separation of the sexes in the church ceased to be observed, a small tablet called the *pax*, the *tabula pacis* (tablet of peace), or the *osculatorium*, bearing the image of Christ crucified, or of the Lamb, was kissed first by the bishop, then by the inferior clergy, and finally by the people. The ceremony called giving the pax, as performed in Roman Catholic churches at the present day, is merely a relic of the old custom. Just before the communion at solemn high masses the officiating clergyman turns to the deacon, and, extending his hands and touching him on the arms, inclines his head toward the deacon's left shoulder, saying, *Pax tecum* ("Peace be with thee"); to which the deacon answers, *Et cum spiritu tuo* ("And with thy spirit"). The deacon gives the pax in the same manner to the subdeacon, and each of the inferior ministers to the one next below him in dignity. The people have no part in it. When solemn high mass is celebrated in the presence of the bishop, the celebrant, after giving in this manner the kiss of peace to the deacon, kisses a pax presented to him by the latter, which is then borne to the bishop, who kisses it in turn, and then imparts the peace to his assistants.

PAXTON, Sir **Joseph,** an English horticulturist, born at Milton-Bryant, near Woburn, Bedfordshire, Aug. 3, 1803, died at Sydenham, June 8, 1865. He was educated at the Woburn free school, and was subsequently employed as a gardener by the duke of Devonshire, who made him the manager of his Derbyshire estates, and superintendent of the works which rendered Chatsworth the most celebrated country seat in England. He planned and superintended the erection in 1851 of the crystal palace in London, for which he was knighted; and after the close of the exhibition he enlarged and reërected the building at Sydenham.

He was elected fellow of the horticultural society in 1826, and fellow of the Linnæan society in 1833; and in 1844 the emperor of Russia created him a knight of the order of St. Vladimir. From 1854 till his death he was member of parliament for Coventry. He published a "Practical Treatise on the Culture of the Dahlia" (1838), a "Cottage Calendar," and a "Pocket Botanical Dictionary," and edited the "Magazine of Botany and Flowering Plants," and with John Lindley "The Flower Garden" (3 vols. 4to, 1850–'53). He also assisted in editing the "Horticultural Register" and the "Botanical Magazine."

PAYEN, Anselme, a French chemist, born in Paris, Jan. 6, 1795, died there, May 24, 1871. He studied under Thénard, and conducted for many years his father's sugar manufactory at Vaugirard. In 1836 he became professor at the school of trades and manufactures, and lecturer also at the *conservatoire des arts et métiers.* He was elected to the academy in 1842. His principal works are: *Cours de chimie élémentaire et industrielle* (2 vols., Paris, 1830–'31); *Manuel de cours de chimie organique appliquée aux arts industriels et agricoles* (1841–'3); *Précis de chimie industrielle* (2 vols., 1849; 4th ed., 1859); and *Traité complet de la distillation* (1862; 5th ed., 1866).

PAYMENT, in law, the discharge of a debt by a delivery of the amount due. The party entitled to receive the money may give notice to him who should pay it, that he requires the payment to be made directly to himself, and then no other payment discharges the debt; but without such notice, payment may be effectually made in the ordinary course of business to the creditor's general agent, or to his attorney. But the agent or attorney must be agent for that purpose. Hence payment to a man's wife, child, servant, clerk, or even attorney or auctioneer, has not the effect of a payment to the party himself, unless this authority to receive the money be shown; but it may be shown indirectly, by usage or other circumstances. Here, however, another general principle of agency comes in; and if the party receiving the money bears to the party paying it all the appearance of agency and authority, and this by the act or consent of the creditor, it is the same thing as if he were actually the agent. So an actual agent can receive payment only according to his authority; thus, if he is authorized to receive payment of a debt in money and receives it in goods or by note, and gives a receipt therefor, the principal is not bound by the receipt.—If there be joint creditors, as if two or more persons deposit money in a bank to their joint credit, a payment to either of them without the consent of the other does not discharge the debt. The cases of partners, executors, and administrators are exceptions to this rule. In general, payment to a trustee is valid as against any claim of the party having the beneficial interest in the trust, even if he be defrauded by the trustee, unless the person paying be a party to the fraud or consent to it.—Formerly, a payment of a part of a debt was no satisfaction of the whole, even if that were agreed upon; the reason being that the creditor who promised to give up a large debt, all of which was due to him, on the payment of a part only, made the promise without legal consideration. Now, however, it seems to be established that a fair and well understood compromise of a debt, honestly carried into effect, is a complete payment or discharge of the debt.—Payment of money is often made by letter; and some difficult questions have arisen under this mode of payment. The law may be stated thus. If the money reaches the creditor, the debtor is of course discharged. If it does not, he is still discharged if he was directed by the creditor to make the payment in this way, or if he can derive such authority from the certain and unquestionable course or usage of business; but not otherwise. The same rule or principle would apply if the debtor sent the money, not by mail, but by an expressman, or by a private carrier.—As paper money or bank notes are in universal use in this country, and payment is generally made by them, the law on this subject is of much importance. The questions are: If the notes are forged, where is the loss? If the notes are genuine but the bank is insolvent, where is the loss? As to the first point, if the notes prove to be forgeries, they do not discharge the debt, being considered in law mere nullities. If they are genuine, but not good by reason of the insolvency of the bank, the rules of law are more uncertain. It may be said that generally, and where there is no fraud or negligence on either side, the loss in such cases falls on the party paying, and he must make up the difference between the actual and the nominal value of the notes. This, however, must be so far qualified, as that if the creditor receiving the money, by his subsequent negligence, as by receiving and retaining the notes without any inquiry or notice, prevents the debtor from profiting by any remedy or indemnity he might have had if due notice had been given him, the loss to this extent must fall on the creditor.—Payment is also often made by the debtor drawing his check upon a bank for the amount due, or by his presenting to the creditor some other man's check which he holds. Now a check is a draft, and, being payable to order or to bearer, is negotiable either by indorsement or by delivery; and it is in most respects embraced within the law of promissory notes and bills of exchange. (See NEGOTIABLE PAPER.) If the creditor draws the money, then of course payment is made. But if he fails to receive the money, it is no payment, unless this failure be his own fault; for he must not be negligent with it. It need not be presented on the day on which it was received, but it must be presented within a reasonable time thereafter; for if the bank would have paid it when it was drawn, but the check was kept a week, and then the bank failed, the creditor loses the money by this unreasonable delay. What delay is excusable, and what is not, is not settled by any positive rule, but is determined in each case by its own circumstances. If the drawer had no funds in the bank, and no adequate arrangement for funds, when he drew the check, it need not be presented at all in order to bind him, because the drawing of such a check, and using it as payment, was itself a fraud upon the creditor.—Payment is sometimes made by note; and if this be a negotiable note, it may be an absolute payment, discharging the original debt, and leaving the creditor no claim excepting on the note itself. The law of Massachusetts was quite peculiar in this respect; and as this was the law of Maine when they formed but one state, it continued to be the law of Maine after their separation. At present some part of this peculiarity remains. It may be said, however, to be the law of those two states, that if negotiable paper is given for the amount of a debt, the presumption of law is that it was given and received as payment thereof; but this presumption may be rebutted by proof that the parties did not so understand it. But in England and in all the other states, and in the courts of the United States, the presumption of law is against the note being a payment of the debt, without affirmative proof that it was so understood and intended; but this presumption is changed if the creditor assign the note as his own to a third person.—Payment is sometimes made to a third party, to be held by him until some question is determined or some right ascertained. Such a third party becomes a stakeholder. For the rights and duties of a stakeholder in a case of wager, see Wager. But one may be a stakeholder in other ways. Thus an auctioneer may receive from a purchaser a sum of money by way of deposit or security, to be kept by him until the title to the property bought can be investigated; and to pay it over to the seller if that be good, or to the purchaser if it be bad. If such a stakeholder pays the money over before the question is determined, he pays it in his own wrong, and at his own peril; for it is his duty simply to hold the money. And it is said that if such stakeholder pays the money to a creditor before his right is determined, the depositor may at once sue him and recover the money without any reference to the state of the question between the creditor and himself. But if the deposit be made by check, the stakeholder may draw the money, and hold it or even use it, without making himself liable for the amount.—The law of appropriation of payments is of much importance. It determines the right of applying a payment in one way or in another, or to one debt or to another. The general rule, upon which all others are founded, is, that whoever pays money may direct the appropriation as he pleases; or, in other words, pay it on such account as he chooses. But if the party paying the money makes no such appropriation, the party receiving it may make such application of it as he pleases; and if neither party makes any specific appropriation, it rests with the law to make it according as the justice and equity of the whole case may require. These rules are held to apply even where the debts are of very different descriptions. Thus, if A owes B $100 on a bond, and as much more on a note, and as much more on simple book account, and pays $100, the appropriation of this payment shall be determined to one or other of these debts, in accordance with the above rules. As the payer may certainly appropriate the money as he will, if he declines doing so, this gives the payee the power of appropriating it at his pleasure, although in a way adverse to the interest of the payer. Thus, if A's wife owed money to B before marriage, and A also owes B, and A pays B a sum of money without specific appropriation, B may apply the money to the debt of A's wife. So, if A owes B two debts, one of which is more than six years old and so is barred, and the other is not, and pays money without appropriation, B may apply it to the debt which A was not legally compellable to pay; but he cannot by such appropriation revive the remainder of the barred debt, and then make B pay the balance. The appropriation, to have full force, must be made at or very near the time when the money is paid. For if either party at some subsequent period finds out what will be to his advantage, and then undertakes to make such a disposition of it, this will not avail him to the disadvantage of the other; but the law will consider this as a case in which it must make an appropriation because the parties did not. So also an appropriation by either party will not affect the other party unless it be communicated to him. Thus, mere entries in the books of either party do not affect the other party; but if these entries were shown to the other party, then they bind him. And although the payment be general, the creditor cannot make the appropriation, provided the debts due to him are due in different rights. Thus, if A, as executor of C, owes B a debt, and also owes him a private and personal debt, and pays money generally, B must appropriate it first to the payment of the private and personal debt. Nor has the creditor the right of appropriation merely because the debtor did not make an appropriation, if the payment were made in such a way as to prevent the debtor from appropriating it; as on his account by some other person, or in any way which impaired his power of exercising his right.—Where the court makes the appropriation because the parties do not, it will generally favor the creditor so far as to apply it to the most precarious and least secured debt. But if there be two or more debts, and the sum paid will exactly discharge one of them, the court will consider that it was intended to pay that debt. If one of the debts is contingent or uncertain, as if B were the surety of A and might be bound to pay a certain sum if A did not, and A also owed B a certain and specific sum, and A pays a sum generally, B will not be permitted to hold it against his own suretyship, but must apply it to the specific debt. On the other hand, a court sometimes protects a surety, and, in his favor, will direct an appropriation of money paid generally; as if A buys goods of B, and C is the surety of A, and A pays to B money generally, B will be obliged, in justice to C, to apply the money to payment for the goods.—Payments are sometimes made by a debtor, not voluntarily, but by compulsion of law, or by his assignees. In such case there is no appropriation by either party, but the payment is applied to all the debts in proportion to their amount.

PAYNE, John Howard, an American dramatist, born in New York, June 9, 1792, died in Tunis, April 10, 1852. At 13 years of age, while a clerk in a counting house in New York, he edited the "Thespian Mirror," a weekly journal; and in 1807, while a student in Union college, he published 25 numbers of a periodical, "The Pastime." He made his début as an actor at the Park theatre, New York, Feb. 24, 1809, as "Young Norval," and subsequently appeared in Boston, Philadelphia, Baltimore, and elsewhere. On June 4, 1813, he appeared at Drury Lane theatre, London, as "Young Norval," and for nearly 20 years he pursued a career of varied success in England, as actor, manager, and playwright. He translated French dramas, and produced original plays and adaptations, including "Brutus," "Thérèse, or the Orphan of Geneva," and "Clari." The first, produced in 1818, with Edmund Kean in the principal part, still holds possession of the stage. "Clari," which was produced as an opera, contains the celebrated song "Home, Sweet Home," which alone will preserve Payne's name from oblivion. In his play of "Charles the Second," the principal part was a favorite with Charles Kemble. In 1832 he returned to the United States, and in 1841 was appointed American consul at Tunis, which office he held at the time of his death.

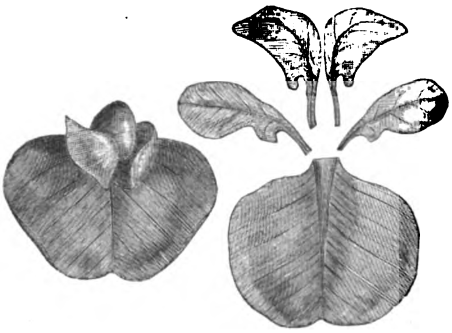
PAYSON, Edward, an American clergyman, born in Rindge, N. H., July 25, 1783, died in Portland, Me., Oct. 22, 1827. He graduated at Harvard college in 1803, and then for three years had charge of an academy in Portland. In 1807 he was licensed to preach, and became associate pastor, and from 1811 till his death was pastor of the Congregational church in Portland. His works, consisting chiefly of sermons and occasional discourses, have been collected, with a memoir by the Rev. Asa Cummings, D. D. (3 vols. 8vo, 1846; new ed., 1859).

PAZZI, Conspiracy of the. See MEDICI, vol. xi., p. 343.

PEA (Lat. *pisum;* Celt. *pis;* Fr. *pois*), a common name for the fruit and plant of *pisum sativum*, and with a qualifying adjective for numerous related plants of the *leguminosæ* or pulse family. Pease, as a plural form, to express quantity or species, is much more in use in England than with us; the older English writers wrote the plural *peason*, to agree with housen, hosen, &c. The garden pea is a smooth and glaucous annual, from six inches to as many feet high, with abruptly pinnate leaves, of usually two pairs of leaflets, and the common petiole terminated by a branching tendril; at the base of the leaf is a pair of conspicuous stipules; peduncles axillary, and bearing one, two, or more white or pale violet flowers, having the irregular form common to a large portion of this family, and known as papilionaceous. The calyx has leafy lobes, and the five petals, unlike in size and in shape, have received fanciful names; the upper and larger petal is the standard (*vexillum*), the two side petals, immediately below this, are the wings (*alæ*), and the two lower ones, usually coherent by their edges, form the keel (*carina*); the stamens are ten in number in two sets (diadelphous), nine being united by their filaments for the greater part of their length, forming an incomplete tube, while one stamen, the uppermost, is entirely free; ovary one-celled, terminated by a rigid style, flattened laterally and bearded down the inner edge; pod somewhat fleshy, several-seeded; the seeds globose, with very thick cotyledons which remain underground in germination. Our garden pea was cultivated by the ancient Greeks and Romans, but there is no proof that it was known in early times to

Pea (Pisum sativum)—Leaves, Flowers, and Fruit.

the Egyptians; some regard it as a descendant of the wild field pea (*P. arvense*) of southern Europe, but De Candolle is disposed to admit it as distinct, it having been found wild in the Crimea by a single collector; peas have been found in the Swiss lake dwellings, but they are regarded as some variety, now extinct, related to the field pea. The introduction of the pea into England is supposed to have been by the way of Holland or France in the time of Henry VIII. Probably none of our garden vegetables present so many varieties as the pea, though careful experiments show that many of the named kinds are so like one another as to be undistinguishable; our seedsmen offer from 20 to 40 varieties, and the lists in the English catalogues are still larger. As peas are generally self-fertilized, the structure of the flower being such that crossing cannot occur without the aid of insects, which seldom take the trouble to get at the stamens, the well established varieties come very true to their kind many years in succession; still there are occasional spontaneous variations by seed, which growers take advantage of, and produce some of their new kinds from them by selection, while other varieties are obtained by careful cross fertilization. There are two very distinct classes of peas: the common pea, the best known and by far the largest class, of which the unripe seeds only are eaten, and the eatable-podded, also called sugar, skinless, and string peas, in which the pods have not the tough parchment-like lining present in those of the common kind, but are tender and succulent. In the latter the pods are larger than in the former, and are used in the green state in the same manner as snap or string beans, the young pod being cooked with the seed; there are but few varieties of this class, and they have not attained the place in our gardens which they hold in those of Europe. The common garden peas are of two kinds, one with the seeds, whether young or ripe, quite spherical and smooth, and when ripe yellowish white; the other, known as the wrinkled or marrow pea, have even when ripe a wrinkled surface, and when mature retain more or less of a greenish shade; they are usually much larger than the round peas, and are flattened at the sides by mutual pressure in the pods. These two kinds are still further subdivided into dwarfs, which are from 6 to 18 in. high and need no support, and tall kinds which grow from 2 to 6 ft. high and require brush or other support. All varieties of the round pea are traceable to one called Hotspur with various prefixes, known as long ago as 1670, of which numerous subvarieties or "strains" have been in cultivation ever since; among the names which this and its progeny have borne are Charlton, early Kent, and early Frame; the present well known Dan O'Rourke is a form of this; it grows from 3½ to 4 ft. high, and under one of its many names is more largely cultivated than any other. The most prominent dwarf variety of the round peas is Tom Thumb, which rarely exceeds 9 in. in height, but produces abundantly for the size of the plant, and its pods are fit to pick nearly all at once. Among the wrinkled peas the most universally popular is the Champion of England, a strong-growing variety, 5 to 6 ft. high, with pods 3½ in. long, closely crowded with large peas of the highest excellence. McLean's Little Gem is a dwarf variety of the class of wrinkled peas, not exceeding a foot in height, and excellent in quality. These four are representative varieties in their classes, and the kinds with which all related varieties are compared. Probably no vegetable differs more in quality than this, owing to variety, degree of maturity, and length of time it has been gathered. The wrinkled varieties are much sweeter and better flavored than the round, but on account of the greater earliness of the round, the first peas of the season are always of those kinds; an experienced person can tell by feeling of the pods when they are in proper condition to pick for the table; if too young, the nutritive matter in the seeds is very small in proportion to the envelope or hull, while too great maturity is accompanied by firmness and lack of flavor. Hot and dry weather is very unfavorable to the pea, and the crop is never in this country so satisfactory as in the moister climate of England.—The best soil for peas is a strong clayey loam with abundant vegetable manure; stimulating fertilizers are not needed. In gardens it is customary to sow peas on land that was heavily manured the previous year for some other crop. In market gardens they are sown in rows 5 or 6 ft. apart and the vines allowed to fall down; to prevent injury they are turned over every few days. In private gardens it is usual to sow two rows, a foot or less apart, and when well up to set brush between the rows for the vines to run upon. The dwarf kinds are sown in rows a foot or more apart, and need no brush. The cultivation of peas as a field crop, so common in Europe, is increasing in this country. They are sown broadcast and ploughed under or drilled in; they are often sown together with oats, the two



Pea Flower, entire and dissected, showing the standard, two wings, and the lower petals forming the keel.

being harvested, threshed, and fed together. Peas are very nutritious for animals, and are especially used for sheep and swine; the haulm, or vine, is an excellent sheep fodder. The field variety generally planted in this country is the black-eyed. Peas contain a large amount of flesh-forming principles; analysis shows 22·4 parts of albuminoids and 53·3 of carbohydrates in 100. In the ripe state they form a very nourishing food for man, as well as for domestic animals; in Scotland pea meal is made into thick cakes called pea bannocks, and in the form of split peas, deprived of their skins by machinery, they are largely used to form the nutritious pea soup and pease pudding. In the late war with France the German troops were supplied with rations in the form of a sausage, of which pea meal formed a large part, mixed with fat, meat, and condiments.—The enemies of the pea are mildew and the pea weevil. The mildew, a fungous growth, is best avoided by early and deep sowing; hot weather favors its development. The weevil is a small beetle, *bruchus pisi*, which lays its eggs upon the very young pod; the grub as soon as hatched eats its way through the pod to the young pea; the wounds heal up after it, though a scar may be formed, and the grub, only one in each seed, grows at the expense of the substance of the pea; completing its growth by the time the pea is ripe, it cuts a hole for its future escape, as far as the skin of the seed, and then enters the pupa state; some may come out as perfect insects in the autumn, but the majority remain dormant till spring. The embryo being avoided by the insect, infested peas will germinate; but as the young plants are thus deprived of their proper amount of nourishment, the grub having appropriated it, such vines are feeble and unproductive. The pea bug is not known in some localities, and dealers have their seed raised in these places. It is said that the vapor of turpentine will kill the insect, and chloroform has been used for the same purpose, as has scalding.—The cow pea of the southern states is largely cultivated as a forage plant, and it is of the greatest importance in southern agriculture; this, in the appearance of its seeds, is more like a bean than a pea; it is a species of *dolichos* (*vigna* of some authors), so modified by long cultivation that its species is difficult to determine; the writer has a collection of 23 varieties, differing as much in size, color, and markings as those of the garden bean.—The chick pea is *cicer arietinum*, a native of India and southern Europe; it is an erect, branching, hairy annual, with pinnate leaves of six to nine pairs of leaflets, mostly solitary pea-like flowers on long peduncles, and a hairy bladdery pod containing two or three large wrinkled seeds; the surface of these is so irregular as to present somewhat the shape of a ram's head, whence the specific name *arietinum*. The glandular hairs of the plant exude oxalic acid, which sometimes in dry weather appears in minute crystals. This pea, extensively cultivated in the East and in Mexico and South America, is but little known in our gardens; in the countries named it is much eaten, ground into meal and made into cakes, or in soup; the French use it as the basis of a favorite soup, *purée aux croûtons;* it is more indigestible than the common pea. In India this pea is known as *gram*, in Spanish countries as *garbanzo*, and in this country to some extent as coffee pea, as several years ago the seeds were sold at an exorbitant price as a perfect substitute for coffee.—The everlasting or perennial pea is *lathyrus latifolius*, a desirable trailing garden plant, producing a profusion of clusters of pink, purplish, or white flowers. The Japan pea, at present widely advertised as a most valuable plant for its seeds and fodder for the southern states, is a species of *soya*, very near the soy pea, *S. hispida*, if not a form of it. Beach pea, *lathyrus maritimus*, found on the seacoast from New Jersey northward, and on the shores of the great lakes, is also a native of Europe; it has large purple flowers, and is a noticeable wild plant. The sweet pea, a favorite garden annual, is *lathyrus odoratus*, the charming fragrance of which is recognized in its botanical as well as its garden name; it is a native of Sicily, and is in general cultivation. The vine resembles that of the common pea, but is hairy, and produces its flowers two or three together on a long peduncle; the seeds are small and nearly black; the flowers in the original state have a rose-colored upper petal or standard, and the rest white. By cultivation numerous varieties have been produced, and the named sorts give pure white, blush, blue, scarlet, and various purples, one of which is so dark that it is called black. The vines, which in good soil grow 5 ft. high, must have a support of some kind to which to cling. In the cultivation of this flower two points are essential to the best results, to sow very early, and to not allow the vines to be exhausted by the production of seeds.

PEABODY, a town of Essex co., Massachusetts, adjoining Salem, and 12 m. N. N. E. of Boston, with which and with the adjoining towns it is connected by rail; pop. in 1870, 7,343. It contains about 60 leather and morocco manufactories, three glue manufactories, a bleachery, print works, two national banks with a joint capital of $400,000, a high school, 6 grammar and 14 primary schools, and 8 churches. A weekly newspaper is published. It was formerly called South Danvers, being separated from the town of Danvers in 1855, and received its present name in 1868 in honor of George Peabody, who was born in this part of Danvers. The Peabody institute, endowed by him with $200,000, is situated here. The building contains a hall for free lectures and a free library of 20,000 volumes. In it are deposited the portrait of Queen Victoria and other tokens of public esteem which had been received by Mr. Peabody.

PEABODY, Andrew Preston, an American clergyman, born in Beverly, Mass., March 19, 1811. He graduated at Harvard college in 1826, studied theology, and in 1832-'3 was a tutor in mathematics in the college. In 1833 he was ordained in the south parish church in Portsmouth, N. H., of which he was pastor till Sept. 1, 1860, when he became preacher and Plummer professor of Christian morals in Harvard university, from which in 1852 he had received the degree of D. D. Dr. Peabody has been industrious as a contributor to periodical literature and a lecturer. From April, 1854, to October, 1863, he was editor of the "North American Review." He has published more than 100 sermons, orations, tracts, and pamphlets; also "Lectures on Christian Doctrine" (1844); "Christian Consolations" (1846); "Christianity the Religion of Nature" (1864); "Sermons for Children" (1866); Reminiscences of European Travel" (1868); "Moral Philosophy" (1873); "Christianity and Science" (1874); and "Christian Belief and Life" (1875). Several of his works have passed through many editions, and with the Rev. John Hopkins Morison he is now (1875) preparing a commentary on the New Testament.

PEABODY, George, an American merchant, born in Danvers, Mass., Feb. 18, 1795, died in London, Nov. 4, 1869. After serving as a clerk in Thetford, Vt., and in Newburyport, Mass., he went to Georgetown, D. C., where he became a partner of Elisha Riggs in a drygoods house, which was removed to Baltimore in 1815, and in 1822 had branches in New York and Philadelphia. In 1837 he settled in London, where in 1843 he established the banking house of George Peabody and co. In 1851 he supplied the sum needed to arrange and display the contributions from the United States in the great exhibition. In 1852 he gave $10,000 toward the second Grinnell arctic expedition under Dr. Kane, and $30,000 to found the Peabody institute in the S. portion of Danvers (now Peabody), to which subsequently he added $170,000, with $50,000 more for a similar institution in North Danvers. He revisited the United States in 1857, and founded the Peabody institute in Baltimore, Md., with $300,000, subsequently increased to $1,000,000. In 1862 he matured his plan for building lodging houses for the poor in London, contributing in all £500,000, with which down to 1874 buildings had been erected in different districts sufficient to accommodate 6,000 persons. In 1866, on another visit to the United States, he founded an institute of archæology in connection with Harvard college, with $150,000, gave $150,000 toward a department of physical science in Yale college, and made a gift of $2,100,000, increased in 1869 to $3,500,000, for the promotion of education in the south, besides contributing to other objects about $200,000. On his return to London in 1867, the queen offered him a baronetcy, which he declined. In 1868 he endowed an art school in Rome, and in 1869 made his last visit to the United States, when he endowed the Peabody museum at Salem, Mass., with $150,000, gave $20,000 for a public library at Newburyport, $30,000 to Phillips academy at Andover, $20,000 to the Maryland historical society, $10,000 to the public library of Thetford, Vt., $25,000 to Kenyon college, Ohio, and $60,000 to Washington college, Va. During his absence, on July 23, 1869, the prince of Wales unveiled a statue of him by W. W. Story, erected by the citizens of London, on the east side of the royal exchange. He returned to London in October, and died within a month. His obsequies were celebrated in Westminster abbey on Nov. 12; his remains were brought home in H. B. M. turret ship Monarch, and buried in Danvers (now Peabody). He left $5,000,000, mostly to his relatives.

PEABODY, William Bourn Oliver, an American clergyman, born in Exeter, N. H., July 9, 1799, died in Springfield, Mass., May 28, 1847. He graduated at Harvard college in 1817, and from 1820 till his death was pastor of a Unitarian society in Springfield. He wrote on ornithology, a memoir of Alexander Wilson in Sparks's "American Biography," and a few hymns and sacred poems. A memoir by his brother, the Rev. O. W. B. Peabody, with selections from his sermons, was completed by Everett Peabody (1849), who edited his "Literary Remains" (1850).—His twin brother, OLIVER WILLIAM BOURN, practised law and edited a newspaper in Exeter, N. H., became in 1822 associate editor of the "North American Review," in 1842 professor of English literature in Jefferson college, Louisiana, and in 1845 minister of a Unitarian congregation in Burlington, Vt., where he died July 5, 1848.

PEACE RIVER, a large stream of British North America, rising in British Columbia, near the source of the Fraser, in about lat. 55° N. It flows first N., receiving Finlay's branch from the N. W., and then breaking through the Rocky mountains pursues a general N. E. course to Lake Athabasca, whence its waters find their way to the Arctic ocean through the Slave and Mackenzie rivers. Its length is about 1,000 m. Its navigation by the Hudson Bay company's boats is interrupted only by a small fall and a few rapids. Its valley is rich and beautiful, and capable of cultivation.

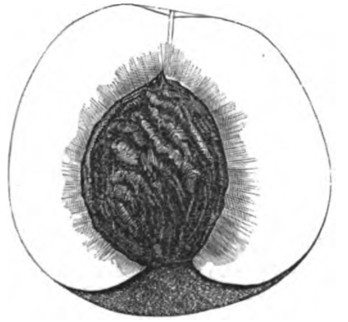
PEACH (Fr. *pêche;* Lat. *persica*), a fruit tree widely cultivated in all countries where the climate is not too severe. It belongs to the rose family (*rosaceæ*), and was formerly called *Persica vulgaris.* Its close affinity with the almond led later botanists to unite it with that, and it now stands in most modern works as *amygdalus Persica;* but there are not sufficient botanical differences between the peach, almond, apricot, plum, and cherry to separate them as distinct genera, and the most recent view places them all in one genus, *prunus,* grouped in several subgenera; in view of this the botanical name for the peach likely to be hereafter accepted is *prunus Persica.* The belief that the peach originated in Persia is indicated in its early generic and present specific names, and by its having been formerly called *malum Persicum;* it was apparently brought from that country to Europe, but De Candolle, who has carefully investigated the matter, regards the trees growing wild in Turkey, Persia, and other parts of western Asia as indications that the fruit has long been cultivated in those countries, and thinks its probable origin was in China, where it has been cultivated from the earliest times. The peach is not mentioned in the Bible, though the almond is named several times. Darwin evidently inclines to the view that the peach is derived from the almond, as the two have been cross-fertilized and produced fruit intermediate in character; this with other facts supporting this view, as well as the evidence to the contrary, are given in detail in his "Plants and Animals under Domestication" (1868).—The peach is a tree of medium size with a spreading head, rarely reaching 30 ft., and usually not more than 15 or 20 ft. high; it is commonly regarded as a short-lived tree, but in a genial soil and climate it attains a good age, there being in Virginia trees that were planted 70 years ago, and there is in France a vigorous tree known to be 95 years old and supposed to be considerably over 100. The leaves are petioled, long, narrowly lanceolate, and serrate, of a deep green color, which in autumn turns yellowish or brown; upon the petioles and at the base of the leaf are often found small glands which are of use in describing varieties, and the presence or absence of these glands is pretty constantly attended by differences in the serratures or teeth on the margin of the leaf; in varieties without glands, the leaves are deeply and very sharply toothed, while if present the serration is crenate, the teeth being rounded and shallower; the glands are globose or reniform (kidney-shaped), each form being constant in the same variety. The flowers, which appear before the leaves and from separate scaly buds, have the general structure of those in this section of the rose family; the deciduous calyx has a short bell-shaped tube, with five spreading lobes; the five petals, inserted on the throat of the calyx tube, are spreading and usually rose-colored, varying considerably in size in the cultivated varieties; stamens numerous, with slender filaments, and inserted with the petals; pistil solitary, free, with a single style, the ovary containing two ovules, only one of which is usually developed into a seed. The fruit is of that kind called a drupe or stone fruit; its theoretical structure is that the cells of the carpellary leaf composing the pistil take on, as the fruit grows, two very distinct forms of development; the outer portion, corresponding to the under side of the leaf, becomes fleshy, and when ripe very soft and succulent, while in the inner portion the cells of the upper side of the carpellary leaf become at length filled with an indurating matter, and ultimately form the hard, nut-like body known as the stone. The peach stone is not the seed proper, but a portion of the pericarp or seed vessel; technically, the fleshy part of the peach is the sarcocarp, and the inner the putamen; in some peaches these two parts when ripe are readily separable, such being called freestones, while in others the two are firmly held together, and these are known as clingstones. The stones of the different varieties differ much in their relative length and breadth, and some are terminated by a long sharp point; the

Peach Tree (Amygdalus Persica).

Peach Flower.

Peach Stem—Leaf and Flower Buds.

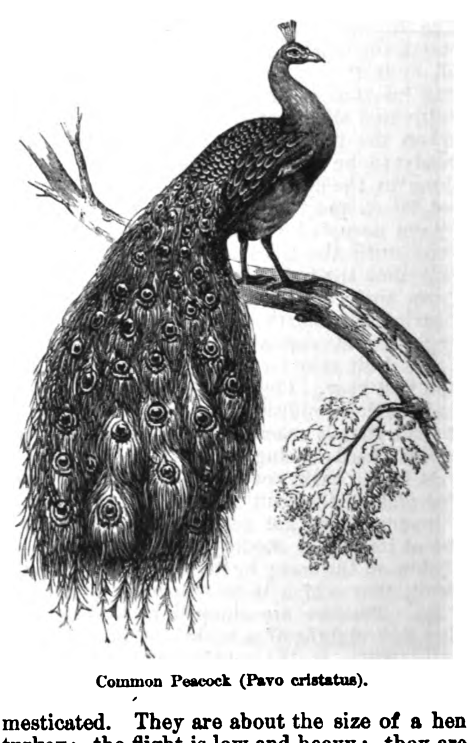
Fruit of Peach.



Peach, in Section.

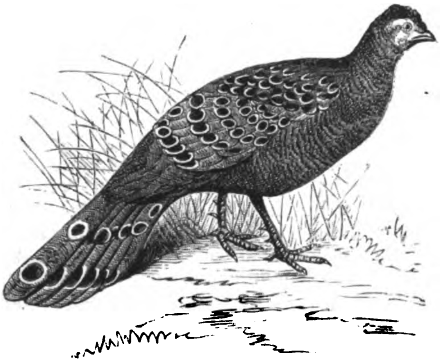
suture, where the two halves of the stone join, varies in prominence, and the irregular pits or furrows with which the surface of the stone is marked are deeper in some varieties than in others; the name *amygdalus* is from the Greek word *ἀμύσσειν*, to lacerate, in reference to these markings upon the stone; all these characters of the stone are of use to the pomologist in distinguishing varieties. Within the stone are usually found a single seed and the remains of an abortive ovule, though it sometimes occurs that both ovules are fertilized, as "double-meated" stones are not rare among both peaches and almonds. The seed proper, or meat as it is popularly called, has a very strong flavor of the bitter almond, and like that is accompanied by prussic acid; the same flavor is perceptible in the leaves.—As a fruit the peach is everywhere held in high esteem, but is nowhere so largely cultivated as in this country, which is said to be the only one in which it is within reach of the poorer classes. The tree comes into bearing in a very few years from the seed, instances being known in which fruit has been borne the second year, or in 16 months from the planting of the stone; some varieties come very true from the seed, but, as is usual with fruits which have been long in cultivation, the seedling often produces fruit unlike that of the parent tree; the short time required to test the quality of seedlings leads to a great increase of the number of varieties, and there are all over the country local kinds of quite as good quality as those admitted into the catalogues and fruit lists. In Downing's "Fruits" (1869) there are enumerated over 130 varieties, and the catalogues of nurserymen include a number not in this work; indeed, new varieties are constantly appearing for which some peculiar excellence is claimed. Some of our standard varieties are of European origin and have been long in cultivation, but the majority have originated in this country; while some will succeed wherever peaches will grow at all, others are only suited to particular localities. In a pomological classification peaches are divided into freestones (also called melters) and clingstones; these divisions are subdivided into two classes, the white or light-colored, and the yellow-fleshed. These classes each present three sections: 1, those without glands at the base of the leaf and with sharp serratures; 2, with globose glands and blunt serratures; and 3, having kidney-shaped glands and blunt serratures. To the peach grower the time of ripening is of more importance than any other character, and one largely engaged in cultivating will endeavor to have a selection of sorts ripening continuously from the beginning to the end of the season, and this selection will vary according to locality. The earliest varieties are early Beatrice (English) and Hale's early (American); among the latest are Smock, Stump the World, and Ward's late (all American); among the intermediate varieties generally popular are early York, Troth's early, Oldmixon, Crawford's early, Crawford's late, red rare ripe, Morris white, &c. The great peach region of the eastern states includes the state of Delaware and the counties of Maryland and Virginia bordering on the Chesapeake bay; though some fruit is sent from further south, this region supplies the great bulk of the peaches sold in northern markets; in good seasons, between three and four millions of baskets, or their equivalent in crates, are sent from this district, while immense quantities are used at home for canning, distilling, and drying; the orchards range all the way from 1,000 or 2,000 trees up to 600 acres entirely devoted to peaches. But few peaches are now produced in New Jersey in comparison with 20 years ago. Another celebrated peach district is on the lake shore of Michigan, which, though so far north, has its climate modified by the proximity of large bodies of water, and produces profitable crops which find a ready market in Chicago, Detroit, and other western cities. Ohio, Illinois, Missouri, and other states also produce large quantities of the fruit, and in California the production is immense.—In establishing an orchard, the planter purchases his trees from a nursery, or, as is the custom in large orchards, produces them himself. The stocks are raised from seeds, those being preferred from what are called natural fruit; in Virginia and other states there are old orchards of seedling fruit (*i. e.*, the trees of which have never been budded), and stocks raised from the seeds of such trees are regarded as more free from disease than from those of finer varieties. The seeds must be exposed to the influence of the weather during winter, the most common method being to spread them in the autumn in a layer 3 in. thick and spade them under; some cover them with several inches of tan bark or saw dust; in spring, the soil for the nursery being prepared and laid out in furrows about 4 ft. apart and 2 in. deep, the seeds are taken from the seed bed and the earth sifted from them; most of them will then have their shells so loosened that they may be removed by the fingers; those which remain firm are cracked with a hammer, and the kernels dropped 2½ in. apart in the furrows and covered. The young trees soon appear, and are kept free from weeds till August or September, when they are budded with the desired variety; budding is done very rapidly, 2,000 buds being a fair day's work, and some very expert hands will put in 3,000. The following spring, as soon as vegetation starts, the stocks are cut off above the bud, and all buds that appear on the stock below the one inserted are rubbed off; the soil is well cultivated all the season, at the close of which, when the leaves begin to fall, the trees are ready to be set in the orchard. Planting is done in the autumn or spring; the trees are set 20 ft. apart each way, and the spaces between occupied by corn or some other hoed crop until the trees need the room; during this time the trees have the needed pruning to form their heads; they come into profitable bearing the fourth year after planting, yielding on an average a basket to the tree, though some fruit may be borne the second or even the first year. Picking is done when the fruit is in such a condition that it will be fit for use by the time it reaches the consumer, and it is always hard; a single soft peach will spoil the rest in the basket or crate; from the necessity for picking the fruit before it is fully ripe, the consumer does not get it in perfection, as to be at its best it should come into eating condition on the tree; in the orchards all the best fruit, that which is tree-ripened, goes to the pigs. Peaches are shipped in baskets holding five eighths of a bushel, or in crates with a partition in the middle, each half of the capacity of a basket; extra choice fruit is "sprigged" by having a leafy branch of the tree at the top of the basket or crate; special trains with cars properly fitted for the traffic are run during the season from the peach centres to New York and Philadelphia. After the crop is off, fertilizers are applied, the ground ploughed, and the trees pruned; a heavy crop often breaks down limbs, which have to be removed.—The canning of peaches is now an immense business; the headquarters are at Baltimore, where the establishments put up oysters in winter and peaches, tomatoes, and other fruits in summer; in some instances owners of large orchards have their own canning establishments on the place. The process of preserving is very simple; the cans are rapidly made by machinery, and have a circular opening at one end for the admission of fruit; the peaches, peeled and halved by hand, are thrown into a hopper from which a spout leads to the floor below; the cans are placed under this spout, and by aid of the fingers rapidly filled; a weak sirup is run into the can to fill all the interstices; then it goes to the solderer, who puts on the circular cover; this has a small hole pricked in it to allow of the escape of the air which is expanded by the heat of the soldering iron; when the edge of the cover is secured, this hole is closed by a touch of solder; a large number of cans are placed on an iron grating and lowered into a vat of water at the bottom of which is a coil of pipe; high-pressure steam is let into this coil, and as the cans heat they are closely watched; if air bubbles are seen to be given off by a can, that is removed as imperfect; the water is raised to boiling, and the cans remain until their contents are heated to this temperature quite through. Considerable quantities of fruit are dried in various parts of the country by simply exposing it in slices to the heat of the sun; such fruit is always dark-colored and greatly inferior to that prepared in the several patented kinds of drying apparatus, where artificial heat removes the moisture in a few hours. In some orchards the soft and inferior fruit has the juice pressed from it, fermented, and distilled to produce peach brandy; the present excise laws have greatly diminished this manufacture.—Our climate is, except in the northernmost parts of the country, so favorable to the growth of the peach that the training upon walls and trellises, so much practised in Europe, is unnecessary here. By cultivation under glass the fruit may be forced, and those who live north of the limit of successful outdoor culture can enjoy the fruit by growing it in houses without artificial heat; peach houses are very common abroad, and some fine examples exist in this country in the grounds of wealthy proprietors; the trees are usually planted out, but they may be grown in pots or tubs, as the tree is very tractable, and by proper pruning fine specimens about 3 ft. high may be formed, which when loaded with fruit are beautiful objects.—The peach grower has several enemies to contend with. The curl is a disease which attacks the young leaves, causing them to swell up and become distorted; it is supposed by some to be due to an aphis or plant louse, but this is very doubtful. It is not nearly so serious as the yellows, which manifests itself in premature ripening, weak growth of shoots, and sickly yellow leaves, and soon causes the death of the tree; it is communicable from one tree to another, and is probably correctly ascribed to a minute fungus; the remedy is to cut and burn the trees on the first appearance of the disease. The curculio, so destructive to the plum, attacks the peach also, and in some localities is a serious drawback; the only remedy is to jar off, catch, and kill the insect. The peach borer is the larva of *Ægeria exitiosa*, and the most troublesome of all the enemies to the tree; the perfect insect, though it has much the appearance of a wasp, is a moth; the female is dark blue, the under wings transparent and with an orange-colored band across the abdomen; she deposits her eggs upon the bark of the tree near the ground, beginning in the middle of June and sometimes appearing all summer; the young larva makes its way into the tree and lives upon the new wood, to which it is very destructive; it undergoes its transformations and comes out the next spring as a perfect insect; the presence of the borer is indicated by an exudation of gum from the wound, and the only remedy is to cut or dig it out; in the orchards the hands, after picking is over, are set at "worming," or searching for and killing borers. A frequent cause of failure in the peach crop is one against which no precautions can avail—the destruction of the flower buds by intense cold during the winter; spring frosts, unless at flowering time, do but little injury. The peach tree is remarkably excitable, and a warm spell, such as frequently occurs in winter, will awaken the vegetative powers sufficiently to cause the buds to swell, though but slightly; if under these conditions a sudden change takes place, and, as sometimes happens, the temperature goes below zero, the fruit buds are quite sure to be killed.—There are a number of ornamental varieties of the peach, among the best known of which are several double sorts which produce a profusion of flowers as double as roses; one of these, the camellia-flowered, is especially beautiful; some of them bear fruit of an indifferent quality. The dwarf varieties are curious, producing fruit when one or two feet high; one of these, the golden dwarf, originated in Georgia, another is Italian, and others are Australian. The weeping peach originated with the late William Reid of Elizabeth, N. J., and bears his name; when grafted on a plum stock 6 ft. high, its branches hang down like those of a weeping willow, and it makes a handsome lawn tree; it produces an abundance of fruit, which however is fit only for cooking; the seedlings are said to show the same pendulous habit. A blood-leaved or purple-leaved variety of the peach is very showy in spring, but the leaves do not retain their dark purple color through the summer. The *peen-to*, or flat peach of China, has its fruit so singularly compressed that the two ends of the stone are only covered by the skin, the flesh being all at the sides. Another curiosity from China is the crooked peach, in which the fruit is long and crooked, and remarkably sweet.

PEACOCK, a gallinaceous bird of the pheasant family, and subfamily *pavoninæ*, which includes, according to Gray, the genera *pavo* (Linn.), *polyplectron* (Temm.), and *crossoptilon* (Hodgs.), all natives of India and its archipelago. In the genus *pavo* the bill is moderate, with the base of the culmen elevated, the apical half arched and vaulted, and the sides compressed; wings short and rounded, with the sixth quill the longest; head plumed and crested, and orbital region naked; the tail composed of 18 feathers, long and rounded, but in the males concealed by the greatly lengthened coverts; tarsi long and strong, with large transverse scales in front, and armed with a conical spur; toes moderate, the anterior ones united at the base by a membrane. They are splendid birds, preferring in the wild state wooded districts and low jungles; they are sufficiently hardy to endure the severe cold of the mountains of northern India; they roost on high branches, and make the nest on the ground among thick shrubs; the male does not attain his perfect train until the third year. The wild birds are more brilliant than the domesticated. They are about the size of a hen turkey; the flight is low and heavy; they are polygamous, and lay from 12 to 20 eggs, about the size of those of a goose, and raise only one



Common Peacock (Pavo cristatus).

brood in a year. Some are more or less variegated, and occasionally one is seen entirely white. The food consists of grain, seeds, fruits, and insects. The common peacock (*P. cristatus*, Linn.) is probably the most magnificent of birds; its form is elegant, its movements graceful, and its plumage resplendent with tints of green, golden, bronze, and blue; the long tail coverts, which the male can spread like a fan, are beautiful beyond description, with their metallic and iridescent hues, white shafts, velvet-black centre, and brilliant terminal eye spots; the head is surmounted by a very elegant tuft of feathers. The female is brownish and sombre, and destitute of the train. The voice is harsh and disagreeable; its vanity has been proverbial from early antiquity. The peacock was brought to Palestine by the fleets of Solomon, and to Europe at a very early period; it is now dispersed in a domesticated state all over Europe and the United States. In ancient Rome their costliness made them favorite luxuries for the table, and a dish of peacocks' brains and tongues was regarded as a necessary part of an ostentatious feast; even in the middle ages they formed a standing dish in grand entertainments; the moderns think their flesh dry and tough, and keep them only as ornaments. In the domesticated state they agree well with turkeys, but not always with other poultry; it is necessary to protect them from the cold of our northern winters; in the wild state they have a propensity to roost on the branches of trees, and should therefore have an opportunity to perch; barley is the most common food given to them, and to this may be added millet and other grains, and leguminous vegetables; the females are apt to neglect their eggs and young, hence the services of a hen turkey are generally required.—In the genus *polyplectron* the bill is slender, straight, half vaulted at the apex, and curved to the tip, with compressed sides, and covered with plumes at the base; the tail is lengthened, broad, and rounded, without the long coverts of the preceding genus; the tarsi armed in the males with two or three spurs, in the females tuberculate; toes long and slender, the anterior united at base, and the hind one elevated. About half a dozen species, all showy, are found in mountainous districts of India. The iris peacock (*P. bicalcaratum*, Temm.) is about as large as a domestic fowl, mottled with ash-colored, white, and brown; wings and tail and their coverts with rows of gilded, bronzed, purple, and reddish spots, with bluish and green reflections. The Thibet peacock (*P. Tibetanum*, Temm.) is rather larger, and differs principally from the last in the blackish lines of the plumage; the tail is reddish, each feather having a double ocellated green spot; it is hardy, and a great favorite in the aviaries of the wealthy Chinese.—In the genus *crossoptilon* the bill is shorter than the head, broad at the base, with the lateral margins curved, the upper mandible spreading beyond the lower and overhanging it; tail lengthened and broad, rounded at the end, with the coverts slightly covering the base; tarsi strong, covered in front with divided scales, and armed with a spur; hind toe short and elevated; claws strong and curved; sides of the head covered with a papillose skin; the feathers loose and hair-like. The *C. auritum* (Hodgs.) is peculiar to the mountains of Thibet, and is very rare; the general color is white, with the primaries brown, the secondaries bluish cinereous, the feet and orbital region red, and the crown bluish black, of rigid feathers in vertical laminæ; an ear tuft of long, decomposed white plumes; the tail with bluish, green, and purplish reflections, the lateral feathers with a subterminal oval white spot.

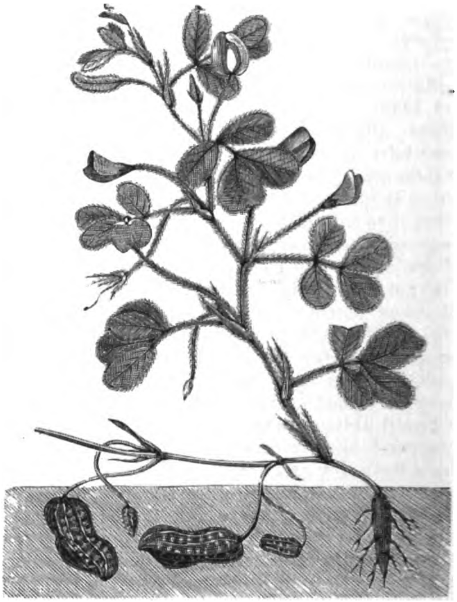


Thibet Peacock (Polyplectron Tibetanum).

PEACOCK, Thomas Love, an English author, born in Weymouth, Oct. 18, 1785, died in London, Jan. 23, 1866. He entered the East India house in 1818, and was examiner of India correspondence from 1836 till March, 1856, when he retired on a pension. He was a friend of Charles Lamb and Shelley, and was Shelley's executor. In 1804 he published "The Monks of St. Mark," followed by "Palmyra and other Poems" (1806), "Genius of the Thames," a poem (1810), and "The Philosophy of Melancholy," a poem (1812), none of which attracted particular attention. In 1816 his first novel, "Headlong Hall," won immediate favor; it has been repeatedly republished. This was followed by "Melincourt" (1817), and "Nightmare Abbey" (1818). His most ambitious poem, "Rhododaphne" (1818), was followed by the tales "Maid Marian" (1822), "Misfortunes of Elphin" (1829), "Crotchet Castle" (1831), and "Gryll Grange" (1861). In 1862 he published "Ælia Lælia Crispio." His "Collected Works," in three volumes, were published in London in 1875, edited by Henry Cole, with a preface by Lord Houghton, and a biographical notice by his granddaughter Edith Nicolls.

PEALE. I. Charles Wilson, an American painter, born in Chesterton, Md., April 16, 1741, died in Philadelphia, Feb. 22, 1827. He was by turns a saddler and harness maker, watch and clock maker, silver smith, painter, modeller, taxidermist, dentist, and lecturer. He received instructions in art from a German painter named Hesselius, and from Copley. In 1770 he visited England, and for several years was a pupil of West. Returning to America, he settled first in Annapolis and afterward in Philadelphia, and acquired celebrity as a portrait painter. Among his works were several portraits of Washington, and a series forming the nucleus of a national portrait gallery. He commanded a company of volunteers in the battles of Trenton and Germantown, and also served in the Pennsylvania legislature. About 1785 he commenced a collection of natural curiosities in Philadelphia, founding the well known "Peale's museum," in which he lectured on natural history. He aided in founding the Pennsylvania academy of fine arts. **II. Rembrandt,** an American painter, second son of the preceding, born in Bucks co., Pa., Feb. 22, 1778, died in Philadelphia, Oct. 3, 1860. In 1796 he settled in Charleston, S. C., as a portrait painter, and between 1801 and 1804 he studied in London under West. Subsequently he passed several years in Paris, and in 1809 returned to Philadelphia. Thenceforth till near the close of his life he was chiefly occupied in portrait painting. Among his other works were two well known historical pictures, "The Roman Daughter" and "The Court of Death;" the latter, 24 by 13 ft. in size, was widely exhibited. He published "Notes on Italy" (Philadelphia, 1831), "Portfolio of an Artist" (1839), and "Graphics" (1845).

PEANUT, a leguminous plant, *arachis hypogæa*, also called ground pea and ground nut, and in some of the southern states known as pindar and goober; by the French it is called *arachide* and *pistache de terre*. The genus *arachis* (a name of unknown origin) comprises seven species, six of which are natives of Brazil, and one, the peanut, is of doubtful nativity, being very generally cultivated in tropical countries; some regard it as indigenous to western Africa. The plant is a diffusely branched trailing annual, with abruptly pinnate leaves with four leaflets; the small yellow flowers are in axillary heads or spikes; calyx with one narrow lobe making a lower lip, the upper lip four-toothed, and with a long thread-like tube; keel of the corolla incurved and pointed; stamens united into a tube by their filaments, each alternate anther shorter than the others; ovary at the bottom of the long calyx tube; after the flower falls away, the forming pod is forced into the soil by the elongation of the rigid deflexed stalk to which it is attached; this stalk is not manifest at flowering time, but appears later, and curves in such a manner as to push the young pod quite below the surface; if by any accident this is prevented, the fruit ceases to grow, but when covered with earth it rapidly enlarges and forms a thick-shelled, indehiscent pod with a strongly netted surface, an inch or more long, often contracted between the seeds, of which it contains two or three; these have very thick cotyledons and an extremely short radicle. This nut is of great commercial importance; immense quantities are produced on the W. coast of Africa to supply the European demand; it is largely cultivated in South America, and in our southern states from Virginia southward it is an important crop. For its culture in this country good corn land is selected, which should not be of a reddish color, as that stains the shells and diminishes the price; the land is marked off in furrows 3 ft. apart, and in these two peas, deprived of their shells, are dropped at intervals of 18 in., and covered an inch and a half deep; the crop is cultivated until the pods begin to form, when it is laid by. Harvesting is done after the first frost; the vines are dug with pronged hoes, allowed to lie two days to dry, and then stacked or taken to a shed to cure; in about two weeks the peanuts are picked from the vines, rejecting the "pops," as the empty pods are called, and cleaned for market; picking is slow work, as an expert hand can pick only about three bushels a day; a machine has been used for this work with fair success. The pods are cleaned by the use of a fanning mill, and as the price much depends upon their bright appearance, they are sometimes placed in a revolving cylinder where they are polished by mutual attrition; and the very white pods are made so by the use of the fumes of burning sulphur to bleach them. A good crop is 100 bushels to the acre, and it is regarded as more profitable than cotton or tobacco. Two varieties are

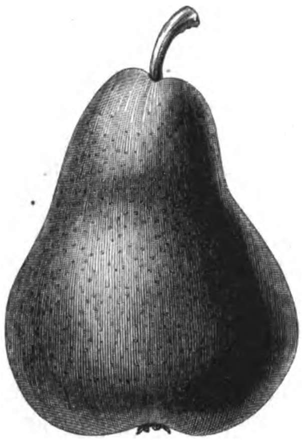


Peanut (Arachis hypogæa).

recognized, the Virginia, which is the larger, and the Carolina or African. The vines when properly harvested, before there has been too much frost, are considered of equal value as food for animals with any other forage crop. Large quantities of peanuts are eaten, usually roasted; but their chief use is for making oil, the seeds containing from 42 to 50 per cent. of a nearly colorless, bland, fixed oil, resembling olive oil and used for similar purposes; the best is obtained by cold expression, but a larger quantity of inferior oil is procured by heating the seeds before pressing; it is a non-drying oil, changing but slowly by exposure to the atmosphere, and remaining fluid in a cold several degrees below 32° F. It contains, besides oleic and palmitic acids, two other oily acids, which have been called the arachic and hypogæic, though it is doubtful if they are really distinct. The principal consumption of the oil is in soap making. In the year 1867 there were imported into Marseilles alone, from Africa, more than 6,000,000 bushels, valued at over 25,000,000 francs. The seeds are also used in the manufacture of chocolate. The peanut may be cultivated in northern gardens by those who wish to witness its curious habit of pushing the pods under ground to ripen, though they will not come to perfection.

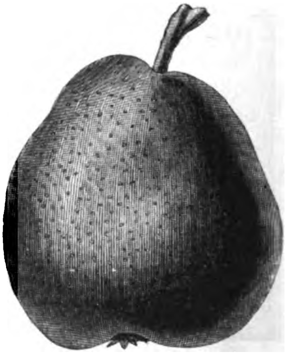
PEAR (It. and Span. *pera;* Fr. *poire;* Lat. *pyrus*), a well known fruit and fruit tree (*pyrus communis*) of temperate climates, belonging to the tribe *pomeæ* of the *rosaceæ* or rose family, and closely related to the apple (*P. malus*). While the fruit of the pear is quite distinct in its sensible qualities from that of the apple, it is difficult to find many botanical characters to distinguish the two as different species. The branches of the pear are inclined to be thorny; the young shoots and leaves are usually smooth; the flowers pure white, with purple anthers, and the fruit generally tapering toward the stem, the base of which is not as in the apple sunk in a cavity; to this last distinction there are occasional exceptions, some varieties being shaped quite like an apple. The habit of the tree is often pyramidal, with ascending branches; its wood is very hard and close, and when dyed black is used by cabinet makers as a substitute for ebony; it is also used by engravers for coarse work; the fruit is usually sugary and melting, with concretions near the core of indurated cells which are exceedingly hard and stony. The pear is a native of the temperate portions of Europe and the Caucasus, and was cultivated in very early times; in Pliny's day there were numerous varieties, which could not have been very choice, as he observes: "All pears whatsoever are but a heavy meat unless well boiled or baked;" indeed, there is reason to believe that the fruit has attained its present excellence within a comparatively recent period. The varieties present such wide differences that many, including M. Decaisne, at one time thought they must have originated from more than one species; but the experiments of Decaisne, eminent as a pomologist as well as a botanist, convinced him that they all probably have the same origin. Philip Miller, who died in 1771, enumerated above 250 varieties, 70 or 80 of which he regarded as select; at the present time, according to Decaisne, there are more than 3,000 varieties given in the various commercial and pomological catalogues; Downing's "Fruits and Fruit Trees of America" (1869) gives descriptions of about 970 varieties as having been cultivated in this country, and foreign and native sorts brought to notice since then will make the number considerably over 1,000; the list of the American pomological society, including only what may be regarded as standard sorts, numbers 95. Some of the many varieties have been produced by direct crossing of two established sorts; others were obtained by ameliorating inferior kinds by reproduction from seed for successive generations under conditions tending to subdue and refine each generation; this was the plan of Van Mons of Belgium, who raised during a life devoted to the pear some 80,000 seedlings in his attempts at improving the fruit. While some excellent varieties have resulted from the direct efforts to improve the pear by various cultivators, it cannot be denied that the number of these is small when compared with those obtained by sowing seed without any system, or discovered as chance seedlings in out-of-the-way places; an American variety, the Seckel, to which no superior in quality has yet been found, is a wild seedling, the parentage of which is quite unknown, and the generally popular Duchesse d'Angoulême is an example of a chance European variety found in a hedge row. The pear is a rather long-lived tree, several specimens in England having been known to be about 400 years old; the tree planted by Peter Stuyvesant, which stood at the corner of 13th street and 3d avenue, New York, at the time of its destruction in 1867 was more than 200 years old; and the remarkable trees near

Flower Cluster.



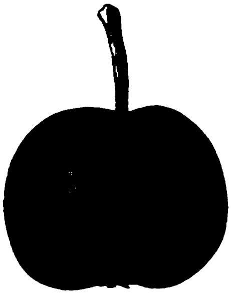
Pyriform Pear—Bartlett.

Detroit, Mich., planted by the early French settlers, must be of nearly two centuries' growth. The tree in cultivation is ordinarily about 20 ft. high, but specimens have been known to reach 60 ft.—Pears are cultivated as standards (the stocks upon which they are budded or grafted being pear seedlings) or as dwarfs; when the pear is grafted on the thorn, the mountain ash, or the quince, its tendency to form a large tree is checked, and its forces, instead of increasing the amount of wood growth, are diverted to fruit-bearing; such trees fruit very early, and in many cases the quality of the fruit is greatly improved. The quince is the only dwarfing stock in general use, though more or less successful experiments are made with the thorn and mountain ash; although the apple is so closely related to the pear, yet when grafted on that the pear is very short-lived and useless. The kind of quince used is the Angers, the stocks being raised from cuttings or by mound layering (see LAYERING); when, as is the case with several, a variety of pear refuses to unite with the quince, it is double-worked, *i. e.*, some variety which unites readily with it is budded upon the quince, and the obstinate variety is worked upon this after it has made a sufficient growth. Dwarf pear trees are comparatively short-lived, but if set in the ground so that the point of union between the pear and quince is well below the surface, the pear stem will form roots of its own and the tree ultimately become a standard. Dwarf trees are suitable to gardens, as they occupy but very little space; and as they are not essentially injured by removal, a tenant can take them to another place with his other effects; but in culture for profit they are well nigh abandoned except for a very few varieties, notably the Duchesse d'Angoulême, which produce better fruit upon the quince than upon their own roots. The pear needs a good strong soil, and to have its fertility kept up by manuring; mulching around the trees, even to covering the whole surface of the ground, is sometimes practised; the trees are best when formed with low heads, and they must of course have the needed pruning and other care as set forth in works on fruit culture. Dwarf trees are usually trained in a pyramidal form, with the branches near the ground the longest, and gradually shorter near the top; in France it would seem that all the refinements of arboriculture had been expended upon the pear, and the various fanciful forms, such as the *vase*, *cordon oblique* and *spirale*, the *palmette*, and others, including ornamental hedges, will be found in the works of Du Breuil, Baltet, and others.—The pear tree has several enemies. Besides leaf-destroying insects, there are those which attack the bark, especially Harris's bark louse (*aspidiotus Harrisii*), which may be destroyed by a strong alkaline wash. None of the insect troubles are equal in magnitude to the blight, which will without warning suddenly destroy a large branch or a whole tree; the cause of this is not positively known, but careful observers regard it as due to a minute fungus; there is nothing to be done but to cut away the diseased portions and burn them.—Various attempts have been made to classify pears into families, such as bergamots, beurrés, &c.; but all such systems have been abandoned by most pomologists, who adopt a simpler classification, founded upon the time of ripening and general form. The three divisions of summer, autumn, and winter pears are convenient, if not very definite, as some varieties may be regarded as late in one division or early in another; in form they vary from round, or even depressed at the ends (oblate), to pyriform, which may be distinct, with a body prolonged into a neck, or obscure, as the ovate and obconical forms; a convenient classification subdivides the three divisions founded upon the season of ripening into three classes, viz., distinct pyriform, obscure pyriform, and roundish. Out of all the thousands of varieties the number grown for profit is very small, rarely more than a dozen; and though the list may vary somewhat in different parts of the country, there are a few kinds, especially the Bartlett, which are successful and popular everywhere. Mr. P. T. Quinn, near Newark, N. J., who grows pears largely and is the author of a practical work on their culture, restricts his varieties to Bart-



Obscure pyriform or obovate Pear—Doyenné Boussock.

lett, doyenné Boussock (early), Duchesse d'Angoulême, beurré Clairgeau, Seckel (autumn), beurré d'Anjou, Lawrence, and Vicar of Winkfield (winter). No pear exceeds the Bartlett in popularity, though ranked by pomologists as only second class in quality; it originated in England about 1770, and being propagated by a nurseryman named Williams, it is known in Europe as Williams's Bonchrétien; it was disseminated in this country by Enoch Bartlett, near Boston, and the proper name having been lost, that of Bartlett has become so firmly fixed that it is impossible to rectify it; it is much more popular here than in England, as our climate suits it better; it is a thrifty tree, comes into bearing when young, and gives abundant crops of large fruit; it succeeds so well in all parts of the country, that it is estimated that out of every 100 trees planted for profit 90 are Bartletts. The Seckel, though small, is universally popular, and no native or foreign variety yet known surpasses or even equals it in quality. The beurré d'Anjou, of French origin, is regarded by our most eminent pomologists as combining more good qualities in a higher degree than any other single variety known.—Pears are much better if picked when mature and allowed to finish ripening in the house; almost all are improved by this treatment, while many which are of first class when treated in this way are worthless if ripened upon the tree; the color of the seeds and the ease with which the stem of the fruit parts from the tree indicate the proper time for gathering; winter varieties are left on until frosty weather, when they are picked and treated like winter apples. Considerable quantities of pears are canned, but the drying of the fruit is more practised abroad than with us.—Perry is prepared from pears in precisely the same manner that cider is made from apples; it is scarcely known in this country, but in England there are large orchards exclusively of perry pears, which are mostly coarse kinds unfit for eating; when well made, perry brings a price equal to that of some kinds of wine.


Oblate Pear—Fulton.

PEARCE, Zachary, an English prelate, born in London, Sept. 8, 1690, died at Little Ealing, June 29, 1774. He was educated at Trinity college, Cambridge, and while there is said to have written two numbers of the "Spectator" (572 and 633), and Nos. 114 and 121 of the "Guardian." In 1739 he was made dean of Winchester, in 1748 bishop of Bangor, and in 1756 bishop of Rochester with the deanery of Westminster added, and later declined the bishopric of London. When 73 years old he wished to resign his offices, but was refused permission. He published "An Account of Trinity College, Cambridge," "The Miracles of Jesus Vindicated," in 4 parts (8vo, 1727-'8), and numerous discourses; but his chief work is "A Commentary, with Notes, on the Four Evangelists and the Acts of the Apostles, together with a new Translation of St. Paul's Epistle to the Corinthians" (2 vols. 4to, 1777).

PEARL, a concretion, consisting chiefly of carbonate of lime, found in several bivalve mollusks, but especially in the *avicula margaritifera* (*meleagrina margaritifera*, Lamarck), or true pearl oyster, and among fresh-water bivalves in the *unio margaritiferus*. Pearls are usually spheriform and yellowish or bluish white. The purest white pearls are most valued in Europe and America, while those of a yellowish hue are preferred by the Hindoos and Arabs. The pearl is rather harder than calcareous spar, but it has the same chemical composition, with the exception that it has in addition, between the many layers of mineral deposit of which it is made, films of animal membrane, which becoming dry give it its hardness. The substance of the pearl is normally deposited upon the interior surface of the shell in the form of a slimy secretion of the exterior of the mantle. Grains of sand or other foreign bodies, lodging between the mantle and the shell, produce an irritation of the delicate tissues which causes the deposition of pearly matter around them for protection. Advantage is taken of this by man, and by the introduction of different foreign bodies pearls of various shapes and dimensions are made to grow. In this way the Chinese compel one species of fresh-water mussel, *unio hyria*, to produce pearls. A plan of making pearls was suggested to the Swedish government by Linnæus. He bored a hole through the shell, thus easily reaching the exterior of the mantle. He was rewarded with £450 for the plan, but it was not found practically successful. The peculiar iridescence of the pearl is of the same nature as the colors of thin plates. (See LIGHT, vol. x., p. 444.) The mother of pearl on the inner side of the shell has the same structure.—From a very early period pearls have ranked among gems, and been highly esteemed as ornaments. The book of Job refers to their great value, and frequent allusions are made to them in other parts of the Scriptures. The Greeks and Romans used them in profusion, and even decorated their feet with pearls. Pliny, after referring to the prodigal display of pearls in his time, adds: "Nay, even more than this, they put them on their feet, and that not merely on the laces of their sandals, but they must needs tread upon them and walk with them under foot as well." He also alludes to the breastplate which Cæsar brought home and dedicated to Venus Genetrix, saying it was formed of British pearls; which confirms the statement of Suetonius that pearls were Cæsar's chief inducement for his British expedition. Pearls vary much in size. Those which are about the size of a pea and of good color and form are most valued, except unusually large specimens, which are rare. The most noted was owned by the late Mr. Hope of England. It weighs 3 oz., and is 4½ in. in circumference and 2 in. in length, but irregular and imperfect. Among the Romans enormous prices were paid for fine ones. Strings of pearls were valued as high as 1,000,000 sesterces, or about $40,000. The pearls in the ear drops of Cleopatra, which she proposed to dissolve in vinegar at a costly repast, the subject of a wager, were valued at about $400,000. In the reign of Queen Elizabeth Sir Thomas Gresham is said to have imitated this feat with a pearl valued at $75,000.—The pearl oyster, from which almost all the pearls of commerce are obtained, is a bivalve of nearly circular form, slightly convex, and sometimes 12 in. in diameter. It is met with in different parts of the world, especially in the Indian ocean and the northern Pacific. Like the common oyster, pearl oysters congregate in large numbers on banks, and are obtained year after year from the same localities. Where the water is shallow, they are sometimes dredged, but they are generally taken by divers. The most noted pearl fisheries are near the coasts of Ceylon, Japan, Java, and Sumatra, and in the Persian gulf. The coasts of Colombia, including the bay of Panama, were long since remarkable for their product of pearls, and they have furnished large amounts of them, but generally of inferior value to the oriental pearls. Still, one possessed by Philip II. of Spain, obtained in 1574 from Margarita, weighed 250 carats, and was valued at $150,000. The Spaniards who first visited the American continent found the natives decked with necklaces and bracelets of pearls, and Montezuma is described in his first interview with Cortes as wearing garments adorned with this precious ornament. In the trade in pearls from the Spanish American coast which soon sprung up, the islet of Cubagua became famous for abundant supplies. On the W. coast of Central America pearls are still procured, which are of fine lustre, but of irregular forms. Small vessels from Mazatlan and Acapulco are employed in this business. Besides the crew, they carry Indian divers, called *buzos*, who receive one fifth of the profits, the remainder being equally divided between the government and the owner of the vessel. Humboldt remarks with surprise that he had never heard of pearls found in the fresh-water shells of South America, though several species of the *unio* genus abound in the rivers of Peru. Pearls of large size were found in the streams of New Jersey near Salem in 1858, and one more than an inch in diameter was sold in Paris for more than $2,000.—Among the most famous pearl fisheries are those of Ceylon and Coromandel, now controlled by the English government. From the time of Pliny, when the Romans obtained their pearls from the same region, Ceylon has always been celebrated for its pearls and pearl divers. The divers are natives trained to this pursuit, and accustomed to descend to depths of 6 or 8 fathoms 40 or 50 times a day. They take down a large stone to hasten their descent, and a bag in which they place the oysters, as they tear them off from the rocks. They remain under water from a minute to a minute and a half. The fishing season begins in March or April, and continues about a month. A single shell often contains from 8 to 12, and in some instances it is said even 20 pearls. The usual dimensions of good oriental pearls are from the size of a pea to about three times that size. Those smaller are called ounce pearls from being sold by weight, and the smallest seed pearls. The pearl fisheries of the Bahrein islands in the Persian gulf are said to yield annually from $1,000,000 to $1,500,000.—Pearls are valued as well for the purity of their lustre as for their size. The smaller ones are worth from 50 cents to $3 each; single fine pearls are worth $5 and upward; and a handsome necklace of pearls as large as peas is worth from $500 to $15,000. Pearls in commerce are classed as oriental and occidental, or Indian and Pacific, and divided into round, pear-shape, and baroque; when smaller than $\frac{1}{16}$ of an inch in diameter, they are termed seed pearls. Mother of pearl is familiarly known in its applications to ornamental purposes, and thousands of tons of the shells are annually exported from the Indian and Pacific oceans, valued according to quality from $70 to $650 a ton; it is used principally for buttons, knife handles, inlaying of furniture, &c., and is often beautifully carved.—False or artificial pearls were formerly made at Murano, a suburb of Venice, of glass lined with a pearl-colored varnish, or with quicksilver; but the French have been of late years the most successful imitators of the natural pearl. The artificial pearls are lined with wax and fish scales, which are taken from the body of the fish (roach and dace) while living, in order to preserve the glistening hue. A variety of the smelt, said to be peculiar to the Tiber, has long afforded the Roman jewellers the means of coating waxen beads so that they have a greater resemblance to pearls than either the Venetian or French.

PEARL, a S. county of Mississippi, separated from Louisiana on the west by the Pearl river; area, 520 sq. m.; pop. about 700. It was formed in 1872 from the N. part of Hancock co. and the S. part of Marion co. The surface is undulating and mostly covered with pine forests. The soil is not generally fertile. Capital, Riceville.

PEARLASH. See Potash.

PEARL RIVER, a stream rising in Winston co., Mississippi, in the E. central portion of the state. It flows S. W. to Jackson, then S. S. E. to the 31st parallel of latitude, and thence S., forming the boundary between Louisiana and Mississippi, and emptying into the gulf of Mexico through Lake Borgne. It is more than 300 m. long. Its navigation is obstructed by sand bars and drift wood, but small boats ascend into Mississippi. Its chief tributary is the Bogue Chitto, which joins it in Louisiana.

PEARLY NAUTILUS. See Nautilus.

PEARSON, John, an English bishop, born at Snoring, Norfolk, Feb. 12, 1613, died in Chester, July 16, 1686. He was educated at King's college, Cambridge, of which he became fellow in 1635; took orders in 1639; and after various preferments was made prebendary of Ely and master of Jesus college, Cambridge, in 1660, Lady Margaret professor of divinity in 1661, and master of Trinity college in 1662. In 1672 he was consecrated bishop of Chester. He published several theological works, but is chiefly remembered for his "Exposition of the Creed" (1659), which has been frequently republished, abridged by several authors, and translated into Latin by Arnold (1691).

PEASANTS' WAR, a revolutionary movement in southern and central Germany, which accompanied the reformation of Luther and Zwingli. It was preceded by many isolated insurrections. In 1476 Hans Böheim, called "Johnny the Piper," proclaimed himself the recipient of revelations from the mother of God, teaching that there should be hereafter no rulers whatever; 34,000 peasants gathered around him, and their sovereign, the bishop of Würzburg, had to resort to treachery to subdue them. In 1492 the "bread and cheese boys," during a famine, captured and held for some time the towns of Alkmaar, Hoorn, and Haarlem in Holland. Immediately afterward there was a rising of the yeomen of West Friesland, to reassert their ancient liberties. While these insurrections in the Netherlands were put down without much bloodshed, great severity was used when a secret league of peasants and burghers was formed in southern Germany under the name of the *Bundschuh* (league of the brogue). It appeared first in 1493 at Schlettstadt in Alsace, in 1502 at Bruchsal, in 1512 at Freiburg, and most powerfully in 1513 in Würtemberg, where it took the name of "the poor Conrad." In Würtemberg 14 articles were agreed upon, similar to the 12 articles adopted by the peasants in 1525. Duke Ulric quelled this insurrection by treacherous promises and wholesale executions. The peasants of Hungary in 1514, having been called to arms against the Turks, were formed into an army by George Dózsa, who carried on a war of extermination against the nobles, destroyed numerous castles, and proclaimed Hungary a republic. After many victories, he was cruelly put to death by John Zápolya, the waywode of Transylvania, and 60,000 peasants perished by the war and the executions which followed. The peasants in Carinthia rose in 1515, and were subdued with great slaughter in 1516.—Up to 1525 nine tenths of the inhabitants of southern and central Germany were not allowed by their rulers to hear the doctrines of the reformation preached; but they understood that at least the power of princely bishops and abbots was contrary to the gospel. They were also encouraged by travelling preachers, who proclaimed a new era of religious, political, and social freedom. To the agitation thus caused were added the systematic and persistent plottings of the exiles who had been forced to leave their homes on the outbreak of the *Bundschuh*, and of the emissaries of Duke Ulric, who, after subduing the peasants, had attacked the free city of Reutlingen, and for this offence had in 1520 been expelled from his duchy by the Swabian league. In a similar position were the Franconian nobles, who in 1522, under Franz von Sickingen, had risen against the princes and bishops, but had been vanquished and fled the country. In June, 1524, the peasants on the banks of the Wutach, in S. W. Germany, rose against the landgrave of Stühlingen. The citizens of Waldshut, animated by their popular preacher Balthasar Hubmaier, made common cause with them, organizing an "evangelical brotherhood" which was to spread all over Germany. The peasants of Hauenstein, the Klettgau, and the Hegau soon joined them. Negotiations between the insurgents and their counts, acting through George of Waldburg, for a time delayed the insurrection; but it spread about the end of 1524 all over Swabia. In the first months of 1525 the Swabian insurgents proclaimed the following 12 articles: 1, every church shall have the right to choose its own minister, who is to proclaim the pure gospel only, and can be deposed if he shows himself unworthy of his office; 2, the proceeds of the tithing shall be applied to the support of the poor and to municipal purposes, a reasonable salary only being appropriated therefrom to the minister; 3, servitude shall be abolished; 4, the exclusive privileges of princes and nobles in regard to hunting and fishing shall be abolished; 5, woodlands unjustly appropriated by the clergy and nobility shall be returned to the village corporations; 6 to 8, the socage service shall be fixed by law, the ground rent reduced, and the feudal tenure regulated; 9, justice shall be administered fairly and firmly according to plain written laws; 10, all fields and pasture grounds arbitrarily taken from the village corporations by the clergy and nobility shall be returned to them; 11, the right of heriot shall be abolished; 12, any of the preceding articles shall be null and void whenever they shall be proved not to be in accordance with the Scriptures. Most of these articles claimed only the restoration of rights formerly possessed by the peasants. The first, second, third, and eleventh contained demands which were new, yet in accordance with the times. Wherever the insurrection spread these 12 articles were proclaimed, sometimes with modifications to make them more acceptable to the nobility. Early in April, 1525, a small part of the peasant army was routed by George of Waldburg near Leipheim on the Danube. Waldburg, the general of the Swabian league, a powerful combination of princes, nobles, and free cities, found he needed time to collect larger forces, and therefore began new negotiations. In the mean time the insurrection gathered strength, spreading southward to Tyrol, Salzburg, and some parts of the archduchy of Austria, and northward over all Franconia. It extended even to Thuringia, where Münzer became its chief leader (see MÜNZER), and to Hesse and the region on the middle Rhine. Numerous cities and towns made common cause with the peasants, in Franconia many nobles did the same, and the entire nobility would have joined them had they accepted the shrewd proposition of Hippler, the chief emissary of Duke Ulric, to indemnify the nobles for their losses by secularizing and dividing among them the possessions of the ecclesiastical princes. Nor did the peasants enlist, as Hippler advised them, several thousand lansquenets, who offered their services. They followed his advice only in choosing the renowned knight Götz von Berlichingen for their general. Hippler busied himself also in getting together a congress of the insurgents, which met at Heilbronn, May 8, and framed a scheme for a new constitution of the German empire; the emperor was to be the only sovereign, and all princes were to be his subjects. Hippler, Weigand, and others were moderate men; but their plans were frequently thwarted by a more radical party, who burned castles and cloisters, and committed still greater atrocities. The principal of these was the massacre of Count Helfenstein with some 20 nobles captured on April 16 at the storming of Weinsberg near Heilbronn; in spite of their entreaties they had to run the gauntlet and were stabbed. Helfenstein while treating with the peasants had continued hostilities. Only one tenth of the Franconian peasants, under command of Rohrbach, had perpetrated the massacre, yet it was charged to the whole body. It terrified the weaker princes and cities menaced by the peasants, and induced them to submit at once; but at the same time it aroused the anger and revenge of Count Waldburg, and caused Luther, who up to this time had held a neutral position, to publish his pamphlet "Against the Rapacious, Murderous Peasants," in which he called on the princes to kill them like mad dogs, and declared that none could die in a way more pleasing to God than fighting against such miscreants. Count Waldburg adopted the ancient policy of dividing the enemy. With the peasant army of southern Swabia, the men who had begun the war, he concluded a treaty at Weingarten, April 17, by which they submitted the question of their wrongs to arbiters and then went home. On May 12, at Böblingen in Würtemberg, Waldburg suddenly attacked and completely routed the peasants of the Black Forest and others; each of the two armies numbered about 15,000 men. On May 15 the peasants of Thuringia, under Münzer, were routed at Frankenhausen, and on May 17 those of Lorraine by Duke Anton near Zabern. These last fought gallantly, and were conquered mainly through treachery. Waldburg now marched against the peasant armies of Franconia; one of them under Metzler was routed at Königshofen, June 2; another near Würzburg, June 4. The leader of the latter, Florian Geyer, and his 600 men, called the black cohort, neither gave nor asked quarter, and all were slain. Geyer, who wanted all castles destroyed, had refused favorable terms to the garrison of the Frauenberg, the citadel above the city of Würzburg, and had besieged it for weeks, instead of marching through the country and spreading the insurrection, as Berlichingen advised. But he showed himself truehearted to the last, while Berlichingen left the peasants at the end of May, under pretence that his time of enlistment in their cause, one month, had expired. On June 8 Waldburg and the princes triumphantly marched into Würzburg, and witnessed the execution of the most prominent citizens, who with the leaders of the peasants, about 80 in all, were publicly beheaded. At many other places also cruel vengeance was taken; Rohrbach was burned at a slow fire. In southeastern Swabia 30,000 peasants of the Allgau still held out against Waldburg, but succumbed July 22, through the strategy of Georg von Frundsberg and the treachery of bribed leaders. With the last peasant army, that of Salzburg, the duke of Bavaria concluded a treaty on terms favorable to the peasants, Aug. 30; but their sovereign, the bishop of Salzburg, failed to fulfil its conditions. Wholesale executions took place after the war. The chief cause of the failure of the movement was lack of unity of action. The peasants did not sufficiently trust and obey their leaders, many of whom were honest and able, while they trusted the princes too much. The burdens of which the peasants had complained were in many cases greatly increased. They lost permanently the right to bear arms, to hold public meetings, and to take part in the election of their officers. The German empire lost its balance of power, which up to that time had been maintained; the peasants, with the cities and the lower nobility, counterbalancing the power of the princes, and strengthening the hands of the emperor. Now the princes reigned supreme, and the power of the emperor was merely nominal. German Protestantism never regained the opportunity lost at this time. The peasants of all Swabia and Franconia, when they rose for liberty, declared themselves in favor of the reformation. When defeated, by far the greater part of them were compelled to return to the Roman Catholic church, and to remain with their posterity in its communion. —See Zimmermann, *Allgemeine Geschichte des grossen Bauernkriegs* (3 vols., Stuttgart, 1841–'3), and Förg, *Deutschland in der Revolutionsperiode* 1522–'5 (Freiburg, 1851).

PEASE, Calvin, an American clergyman, born at Canaan, Conn., Aug. 12, 1813, died in Burlington, Vt., Sept. 17, 1863. He graduated at the university of Vermont in 1838, and in 1842 became professor of Latin and Greek there, and in December, 1855, president of the university. In the latter year he was ordained to the Congregational ministry, having been licensed to preach about five years previously. He was chosen president of the Vermont board of education on its organization in 1856, and took a leading part in unifying the common school system of the state. In the same year he became president of the Vermont teachers' association. In the winter of 1861-'2, on account of his health, he accepted the pastorate of the first Presbyterian church (Old School) in Rochester, N. Y., where he was especially active during the revival of 1863. He published several sermons and addresses.

PEAT, the partially decomposed remains of vegetation that accumulate in localities which are at all times wet or damp. The mass consists of matted roots, leaves, and stems of plants, the forms of which are sometimes distinctly preserved, and at others are lost in the mucky substance produced by their decomposition. It forms layers several feet thick, and in some places repetitions of these are found alternating with others of sand. (See BOG.) There are immense bodies of peat in Ireland, and it also abounds in Scotland and on the continent along the coasts of the North sea. Tracts of peat land occur on the N. E. coast of North America in Labrador, Newfoundland, and Anticosti, where the summers are not excessively warm, and where frequent fogs give the peat mosses the amount of moisture they require. On the S. coast of Anticosti a plain covered with peat extends more than 80 m., with an average breadth of 2 m. and a thickness of from 3 to 10 ft. In the United States peat is little known south of the state of New York; but it is met with in bogs of considerable extent in the N. part of that state, in New England, and west and north to Iowa, Minnesota, and Canada. Its range is chiefly limited to the temperate zones, and to localities where the climate is moist and the subsoil is impervious to water. Darwin says that in the southern hemisphere 45° marks its nearest approach to the equator. Very great differences are observable in peat beds. Some peats are gray, and others red or black; the majority when dry are dark brown-red or snuff color. They also vary remarkably in weight and consistence. Some are compact, destitute of fibres or other traces of vegetation, and on drying shrink greatly and yield tough dense masses, which burn readily and make an excellent fuel; others are light and porous, and remain so on drying, containing much vegetable matter which is but little advanced in the peaty decomposition. Some peats are almost entirely free from mineral matter, and leave when burned but a small percentage of ash; others contain considerable lime or iron in chemical combination, or sand or clay in mechanical admixture. The nature of the vegetation from which peat has been formed has much effect upon its character. Peats chiefly derived from mosses which have grown in the full sunlight have a yellowish red color in their upper layers, which usually becomes darker as we go down, running through brown, until at a considerable depth it is black. Those produced principally from grasses are grayish at the surface, being full of silvery fibres, the skeletons of the grasses and sedges, while below they are commonly black. Moss peat is oftenest fibrous, and when dried forms elastic masses. Grass peat when taken a little below the surface is commonly destitute of fibres, is earthy in appearance when wet, and dries to dense, hard lumps. In Germany the "ripest," most perfectly formed peat is called pitch peat or fat peat; it is dark brown or black, and comparatively heavy and dense. When moist, it is firm, sticky, and coherent, resembling clay, and may be cut and moulded to any shape. On drying it becomes hard, and a burnished surface takes a lustre like wax or pitch. In Holland, Friesland, Holstein, and Denmark, a so-called mud peat is "fished up" from the bottoms of ponds, as a black mud or paste, which on drying becomes hard and dense like the pitchy peat.—The process of burning demonstrates that peat consists of two kinds of substances: one, the larger portion, is combustible, and is organic or vegetable matter; the other, remaining indestructible by fire, is mineral matter or ash. The combustible part of peat varies considerably in its proximate composition. It is an indefinite mixture of perhaps many compound bodies, the precise nature of which is unknown. They have received the collective names of humus and geine, consisting of resinous and bituminous matters, crenic, apocrenic, ulmic, humic, and geic acids, in combination with lime, magnesia, iron, and manganese, and forming ulmates, humates, &c., of these bases. While there is little doubt that other compounds exist in peat, it appears to be certain that these are the chief constituents, to which it owes its peculiar properties. Below are tabulated analyses of some of these substances:

CONSTITUENTS.	Carbon.	Hydrogen.	Oxygen.
Ulmic acid, artificial from sugar.	67·10	4·20	28·70
Humic acid, from Frisian peat..	61·10	4·80	34·60
Crenic acid.....................	56·47	2·74	40·78
Apocrenic acid..................	45·70	4·80	49·50

In general we may say that the ripest and heaviest peat contains 10 or 12 per cent. more carbon and 10 or 12 per cent. less oxygen than the vegetable matter from which it is produced; while between the unaltered vegetation and the last stages of humification, the peat runs through an indefinite number of stages. The mineral part of peat, which remains as ashes, is variable in quantity and composition. Usually a portion of sand, which is sometimes the larger portion, is found in it. Some peats leave when burned much carbonate of lime; others chiefly sulphate of lime; others principally oxide of iron; silicic and phosphoric acids, magnesia, potash, soda, alumina, and chlorine also occur in small quantities in the ash of all peats. With the exception of alumina, all these bodies are important ingredients of agricultural plants. Those bases (lime, oxide of iron, &c.) which are found as carbonates or oxides in the ashes, exist in the peat itself in combination with the humic and other organic acids. When these compounds are destroyed by burning, the bases remain as carbonate.—Peat is valuable as a fertilizer and as fuel. Considered as an amendment to the soil, the value of peat (usually called muck by farmers) depends upon its remarkable power of absorbing and retaining water, both as a liquid and as a vapor; its power of absorbing ammonia; its effect in promoting the disintegration and solution of the mineral ingredients of the soil; and its influence on the temperature of the soil. As a direct fertilizer its value depends upon the organic matters, the inorganic or mineral ingredients, and the peculiarities attending its decay. Peat is directly applied to soils, is placed in stables as an absorbent, or is composted with manures. For either of these purposes it is essential that it be exposed to the weather for six months or a year previous to being used. This "weathering," as it is called, by alternate freezing and thawing completely disintegrates the mass of the peat, and at the same time facilitates certain chemical changes due to the action of the atmosphere, which remove the excess of organic acids and otherwise render it better fitted for incorporation into the soil, and as food for plants.—In Ireland and north European countries peat has long been extensively used as fuel. It is only within a comparatively few years that the increased cost of wood and coal in the older of the United States has directed attention to this abundant source of combustible material. The best peat for fuel is that which is most free from undecomposed vegetable matters, which has therefore a homogeneous brown or black aspect, and is likewise free from admixture of earthy substances. Such peat is usually found at a considerable depth, is unctuous when moist, shrinks greatly in drying, and forms hard and heavy masses when dry. These are the oldest and ripest peats, contain most carbon, and are the most compact. The difference in weight between fresh and dry peat of any quality is very great. Fibrous peat fresh from the bog may contain 90 per cent. of water, of which 70 per cent. must evaporate before it can be called dry. The proportion of water in earthy or pitchy peat is less, but it is always large, so that from 500 to 900 lbs. of fresh peat must be lifted in order to make 100 lbs. of dry fuel. The quantity of water retained by air-dried peat and wood is about the same, 20 per cent., but in thoroughly seasoned wood or peat it may be only 15 per cent. When hot-dried the proportion may be 10 per cent. or less. While peat is still moist it gathers moisture from the air, and in this condition it has been known to burst the sheds in which it was stored, or even to set them on fire; but after becoming dry to the eye and touch, it is no more affected by dampness than seasoned wood.—Peat is prepared for use by hand and by machinery, and is also burned into charcoal and distilled for illuminating gas. It is prepared by hand as follows: The surface material, which from the action of the elements has been pulverized to muck and is full of roots and undecomposed matter, must be removed usually to the depth of a foot or more; a deep ditch is then run from an outlet a short distance into the peat bed, and the working goes on from its banks. It is important that system be followed in raising the peat, or there will be great waste of fuel and of labor. A "field" is next laid off about 20 ft. square, by making vertical thrusts with a sharp spade in parallel lines, as far apart as the breadth of the sods, 4 or 5 in. It is then cut at right angles the length of the sods, 18 or 20 in. The sods are lifted by horizontal thrusts of the spade at a depth of 3 in., and are placed on a light barrow or board and carried off to the drying ground, where they are laid flatwise to drain and dry. In Ireland it is the custom, after the peats have lain thus for a fortnight, to place them on end close together, and after further drying the sods are built up into stacks about 12 or 15 ft. long, and 4 ft. wide at the bottom, narrowing at the top, with a height of 4 to 5 ft. The outer turfs are inclined so as to shed the rain. In these "clamps" on the bog the peat often remains until wanted for use. In Germany it is common to excavate by vertical thrusts of the tool represented in fig. 1. The three sides of this cut as many sides of the block, the bottom being torn out, or a second workman in the ditch cuts out the blocks of a proper thickness by horizontal thrusts of a sharp spade. In Ireland the "slane" is employed, a common form of which is seen in fig. 2, it being a long narrow spade, 20 × 6 in., with a wing at right angles to the blade. In north Prussia the peat-cutting machine of Brosowsky is extensively employed. It consists of a cutter like the four sides of a box, with oblique edges, which by a crank and rack work is forced down into the peat perhaps 20 ft. It can cut only upon the edge of an excavation, and when it has penetrated sufficiently a blade

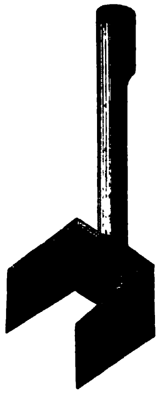


Fig. 1.
German Peat Knife.

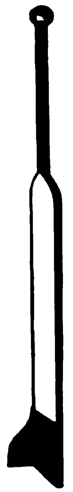


Fig. 2. Irish Slane.

is driven by levers under the cutter. A mass is thus loosened of 24 x 28 in. and perhaps 10 ft. in length. This is lifted by reversing the crank, and the mass cut with the spade into blocks. With this machine four hands will cut and lay out 3,000 cubic feet of peat daily. When peat exists as a paste or mud, saturated with water, it is dredged from the bottom of the bog by means of an iron scoop, like a pail with sharp upper edges, to which is fastened a long handle. The bottom is made of coarse sacking, so that the water may escape. The fine peat is emptied upon the ground, where more water is absorbed or evaporated, so that the mass is left somewhat plastic. It is then placed upon a drying bed enclosed by boards 14 in. wide set on edges. As the peat cracks on the surface by further drying, it is compressed with a mallet or flail or by being trodden by men who have flat boards attached to their feet. The mass is thus reduced to a continuous sheet of half its former thickness, and becomes too firm to receive the impression of a man's foot. After it is cut into blocks, every alternate block is placed crosswise upon the other, air is admitted to the whole, and the blocks are rapidly dried. Peat that cannot be cut, and yet is not so saturated with water as to make mud, is often worked into a paste and moulded into blocks, which when dried become very firm. This is called hand peat or moulded peat.—The mechanical preparation of peat may be effected by pressure, by drying, and by the two combined. Fresh peat has been pressed by direct pressure and between rollers. The latter method is the more effective; but while simple pressure will bring the material into smaller bulk, if it be fibrous and light it is also elastic, and when the pressure is removed it acquires again much of its original volume. At Neustadt, in Hanover, a fibrous peat has been prepared for metallurgical purposes by passing it through iron rollers; it was reduced two thirds in bulk, burned more regularly, gave a coherent coal, and withstood carriage better. On the whole, methods which rely upon pressure alone have not been successful. Other methods reduce the peat to a pulp by grinding it in a sort of pug mill, and then moulding and drying the purified pulp either in sheds, in the open air, or by artificial means. The inventor of the original process was Weber of Staltach in Bavaria. His machine and process have undergone many modifications both in Europe and America. In this country, Mr. T. H. Leavitt of Boston has patented machinery which operates essentially after the plan of Weber, the hot drying omitted. The apparatus consists principally of a strong box 3 ft. square and 6 ft. high, supported upon a stout framework about 4 ft. above the floor of a suitable building, which should be near the bog, and is best constructed on a side hill, so that easy access can be had to the lower story on one side from the foot of the hill, and to the second story on the other side. The top of the tank should be open, and even with the floor of the second story, so that the raw peat can be dumped directly into it, as represented in fig. 3. Within the tank, and firmly fixed to its sides, are numerous projections of a variety of forms, adapted to the treatment of the material in its several stages as it passes through the mill, which is divided into three apartments; through the centre of the tank revolves an upright, to which are affixed knives and arms varying in form and structure to correspond to the stationary projections in each apartment; below the tank is a receiver or hopper; and under this is a moulding or forming machine, 2 ft. wide and 12 ft. long, of simple construction, which receives the condensed material from the hopper and delivers it in blocks of any desired form and size. The whole is adapted to be driven by a small steam engine, and requires about six and ten horse power respectively for the

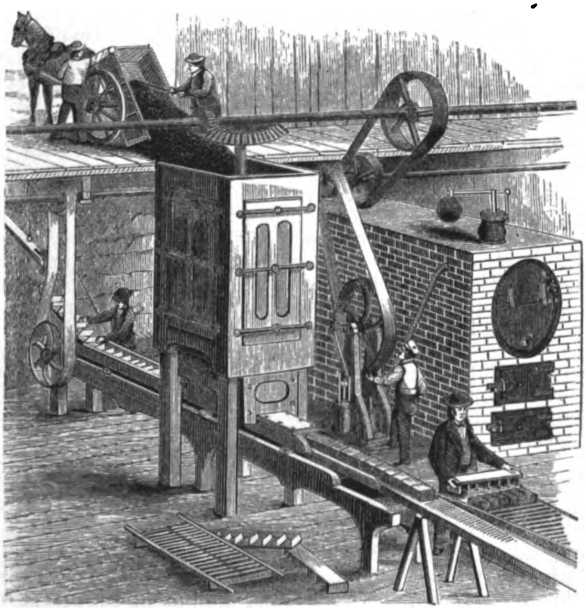
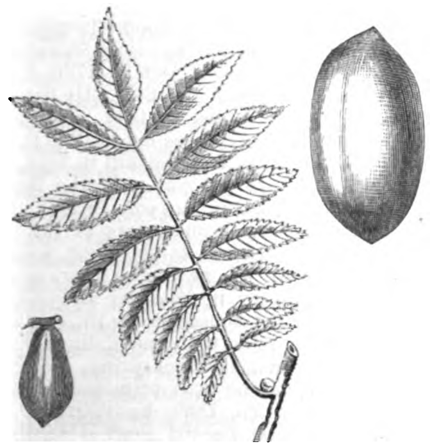


Fig. 3.—Leavitt's Peat Machine.

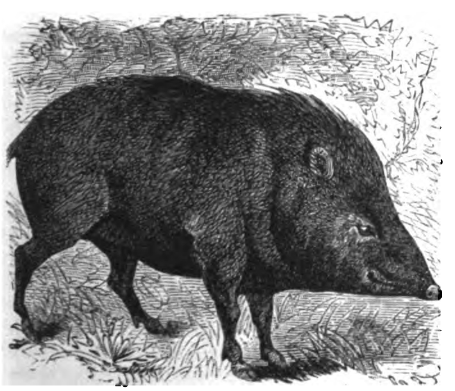
two sizes of machines constructed, of the capacity of 50 and 100 tons each of crude peat per day of ten hours. Mr. James Hodges of Montreal conceived the idea of a manufactory complete, which might be made to float about in the bog, excavating, pulping, manufacturing, and spreading out the pulped peat to dry. There are also the Elsberg, the Ashcroft and Betteley, Aubin's, and Haight's processes, and many others, all of which by different mechanical appliances accomplish the same result, the grinding and moulding of the peat, with subsequent drying, either in the open air or by artificial heat. Among the latest machines devised for this purpose is that of Thomas George Walker, which both grinds and artificially dries the material. The wet peat, after being puddled in a pug-mill vat and heated by waste steam, is forced through the bottom into a box, whence it is blown by a steam jet through 400 ft. of 6-inch cast-iron pipe, coiled up in the furnace under the boiler, by which means it is thoroughly dried. It then passes through a larger pipe into a receiver, at the bottom of which it falls into a mould, where it is pressed into form by a plunger. The residual steam and gases pass from the top of this receiver into a tank through another pipe, whose end is under water, in which any dust carried off by the steam is deposited; and the waste steam and gases thus purified pass thence back to the pug-mill jacket, where they are used to heat the new material. A second tank, under the pug mill, receives the water from the waste steam condensed in the jacket, and all combustible gases rising to the top are conveyed through a pipe to the furnace and utilized as fuel. The successive heating of the peat in the pug-mill vat, and in the long passage through the 6-inch pipe, so prepares it that it is easily moulded into a compact form as it leaves the receiver. A simple and effectual process for condensing peat has been invented by Mr. Franklin Dodge of Oswego, N. Y., which employs a cylindrical mill with perforated disk triturators, placed in a scow and working in the bed. The peat is ground to a pulp, spread on a platform, and exposed to the air for a few days, when it is cut into blocks, turned, and afterward dried in cribs, which completes the process.—Charcoal made from uncompressed peat excels in antiseptic and deodorizing properties. In Carinthia and Hanover the fresh peat is dried in kilns which are heated with the waste heat from certain metallurgical operations. In many European countries peat is also charred in furnaces or kilns, and yields an exceedingly valuable coal, superior to wood charcoal. In S. E. Germany and Austria peat, both air- and kiln-dried, and peat charcoal are extensively used in metallurgical operations, particularly in smelting iron. Peat has also been used to a limited extent in this country for the same purpose. The raw peat can only be used mixed with charcoal, on account of the water it contains.—Distilled in an iron retort, and the volatile products passed through a red-hot iron tube in order to convert the paraffine and ingredients of the tar into gaseous hydrocarbons, 100 parts of peat have yielded, of porous charcoal or peat coke, 36 parts; ammoniacal liquor, 18·88; thick tar containing paraffine, 5·14; and illuminating gas, 40. The illuminating power of the gas was equal only to that of seven candles, but the quantity obtained was at the rate of about 14,000 ft. per ton, which is as much as is afforded by the best boghead cannel coal. When purified by passing through an alkaline mixture, it was found free from sulphur, and in this respect preferable to coal gas. The qualities of the coke are highly extolled; and one of these being its freedom from sulphur, it is well adapted for the reduction of ores, in the treatment of which the presence of this element is highly objectionable. By destructive distillation peat affords a variety of useful products, as pyroligneous acid or crude acetic acid, ammonia, volatile and heavy oils from which paraffine may be obtained, wood naphtha, inflammable gases, charcoal, tar, &c. Extensive works for this purpose were established about 1850 in Ireland.—The chief value of peat in the United States is likely to be for domestic purposes, although it has been used in some localities on locomotives and under steam boilers. It can be burned in open grates, close stoves, furnaces, ranges, and all the ordinary variety of heating apparatus in use in dwelling houses. Fibrous and easily crumbling, peat is usually burned upon a hearth, without a grate either in stoves or open fireplaces. Dense peat burns best upon a grate; the bars should be thin and near together, so that the air may reach every part of the fuel. (See COAL.)

PECAN (Fr. *pacanier*), a species of hickory (*Carya olivæformis*), abundant in the southwestern states, and extending along rivers as far north as Illinois, but not known except in cultivation in the Atlantic states. Its botanical characters are similar to those in other species of the genus (see HICKORY), but the leaflets are more distinctly stalked, and its sterile catkins are fasicled and form buds near the summit of the shoots of the preceding year, instead of being as in the other hickories upon a common peduncle from the base of the shoot of the season; the fruit is oblong with a thin husk; the nut olive-shaped, from an inch to an inch and a half long, with four slight angles, yellowish brown, often with blackish lines; the shell very thin, containing an oily seed, which is sweet and edible, and by many persons preferred to any other nut. The tree is about 60 or 70 ft. high in the forests, but there is one at the Bartram estate near Philadelphia over 90 ft.; the trunk is straight and well shaped, yielding a wood which, though coarse-grained, is heavy and durable. It appears to be long in coming into bearing, trees in France when 30 years old and 30 ft. high having borne no fruit; old trees in the forest bear abundantly. No one seems to have followed Michaux's suggestion to graft this upon the common (English) walnut to promote its growth and fruitfulness. As with the shell-bark hickory, individual trees may be found which produce nuts much larger and with thinner shells than the average; these should be selected for propagation. The home traffic in the nuts is considerable, and large quantities are shipped to Europe, where they are expressed to obtain their oil; in productive years the small port of Indianola, Texas, before the war exported as many as 100,000 bushels.



Pecan (Carya olivæformis). Fruit and Leaf reduced, and Nut of nearly natural size.

PECCARY, a mammal of the hog family, and genus *dicotyles* (Cuv.), peculiar to America. In this genus the incisors are $\frac{4}{6}$; the canines $\frac{1-1}{1-1}$, not projecting beyond the lips as in the wild boar, but very much as in other mammals, small, triangular, and very sharp, the upper ones directed straight downward; the molars $\frac{6-6}{6-6}$, tuberculate; the fore feet are four-toed, and the hind ones three-toed, the outer accessory hoof being wanting; a mere tubercle in place of a tail; according to Cuvier, the metacarpals and metatarsals of the two longest toes on all the feet are united as in ruminants, but this Van der Hoeven says is far from being always the case. On the back, a few inches from the tail, in both sexes, concealed partly by the hair, is a gland which secretes a very fetid fluid; this bears a rude resemblance to a navel, and the generic name was derived from it, from *δίς*, double, and *κοτύλη*, cavity. The head is broad, pointed, and rather large in proportion to the body; the ears moderate and pointed, the eyes small, the snout blunt, the legs thin and slender, and the skin covered with close, very stiff and sharp bristles. The collared peccary or Mexican hog (*D. torquatus*, F. Cuv.) is about 3¼ ft. in the male from snout to root of tail, the female being a little smaller; it is shorter but more compact than the domesticated hog; the hair is ringed with black and white, rather long, lightest at the tip; from each shoulder runs a more or less distinct white collar on each side of the neck. They usually go in couples or in small parties of eight or ten, and not so often in large herds as the next species; they prefer woods and swampy grounds, but wander wherever food is abundant, even into the enclosures of the planter, where they often commit great havoc; when attacked by wild beasts or by man, a herd will form a circle, with the young in the centre, and repel even the jaguar with their sharp teeth, in this way often killing dogs and severely wounding the hunter. The food consists of nuts, fruits, seeds, grain, roots, and whatever living thing they can find on or under the ground; they are omnivorous, though less carnivorous than the domestic hog; the flesh is white and tender, more like that of the hare than the hog, and with very little fat; when the animal is killed, it is necessary at once to cut out the dorsal gland, else the whole flesh would be tainted by its secretion. They live in holes in trees or in the ground, or in any cavity which affords shelter; they are often very bold, and attack men without provocation; a dog unaccustomed to hunting them is at once surrounded and killed. This species is found in Mexico and in the United States as far as the Red river in Arkansas, in lat. 31°, probably as far west as California, and in South America as far as Paraguay in lat. 27° S. When taken young they are easily domesticated, but do not mix or breed with the common hog; they bring forth only once a year, and one or two at a birth; they are rather sensitive to cold, and easily irritated, and manifest pleasure by a hog-like grunt. The white-lipped peccary (*D. labiatus*, Cuv.) is of a general blackish color, with the lower jaw white; it is larger than the last, living in solitary forests in large troops, and is hunted by the natives for its flesh; it is found in South America, but does not associate with the other species. Travellers speak of a variety or perhaps a distinct species in Honduras, of a dirty black color with long tangled hair, going in



Collared Peccary (Dicotyles torquatus).

large herds and very ferocious when attacked; this goes by the name of warree.

PECHT, Friedrich, a German painter, born in Constance, Baden, Oct. 2, 1814. He studied in Munich, was employed in Dresden and Leipsic, and perfected his art in Paris under the direction of Delaroche. He returned to Germany in 1841, and resided in Italy from 1851 to 1854, when he settled in Munich. He has published *Südfrüchte* (2 vols., Leipsic, 1854), and *Die Kunstschätze Venedigs* (Trieste, 1858), and executed paintings in the style of Delaroche.

PECK. I. George, an American clergyman, born in Middlefield, N. Y., Aug. 8, 1797. He united with the Genesee conference of the Methodist Episcopal church in 1816, and in 1824 was appointed presiding elder of the Susquehanna district. He was principal of the Oneida conference seminary from 1835 to 1840, when he was elected editor of the "Quarterly Review" and of the books of the general catalogue of the Methodist book concern; and he was editor of the "Christian Advocate and Journal" from 1848 to 1852. From 1858 to 1872 he was a presiding elder in the Wyoming conference. He was for 57 years an effective preacher, has been a member of every general conference since 1824, is high authority in the ecclesiastical law of his church, and was a member of the evangelical alliance in London in 1846. He now (1875) resides in Scranton, Pa. He has published "Universalism not of the Bible;" "Rule of Faith" (1844); "History of the Apostles and Evangelists;" "Christian Perfection;" "Reply to Dr. Bascom on Slavery;" "Manly Character: Lectures to Young Men" (1853); "Wyoming, its History and Incidents" (1858); "Early Methodism within the Bounds of the Genesee Conference" (1860); "Our Country, its Trial and its Triumph" (1865); and "The Life and Times of George Peck, D. D., written by Himself" (1874). **II. Jesse Truesdell,** an American clergyman, brother of the preceding, born in Middlefield, N. Y., Aug. 14, 1811. He was licensed as a local preacher in 1829, and in 1832 joined the Oneida conference. From 1837 to 1841 he was principal of the Gouverneur Wesleyan seminary, and from 1841 to 1848 of the Troy conference academy at West Poultney, Vt. From 1848 to 1852 he was president of Dickinson college, and was afterward pastor of the Foundry church, Washington, D. C., till 1854, when he was appointed secretary and editor of the tract society of the Methodist Episcopal church. After a pastoral term in the Green street church, New York, he was transferred to California, where he labored eight years as pastor and presiding elder. After his return to the east he was pastor in Peekskill, Albany, and Syracuse, N. Y., till 1872, when he was elected bishop. He was one of the founders and first president of the board of trustees of Syracuse university, and now (1875) resides in Syracuse. He has been five times a member of the general conference, and a fraternal delegate to the Canadian and East British conferences. He has published "The Central Idea of Christianity;" "The True Woman, or Life and Happiness at Home and Abroad" (1857); "What must I do to be Saved?" (1858); and "The History of the Great Republic, considered from a Christian Standpoint" (1868).

PECK, John Mason, an American clergyman, born in Litchfield, Conn., Oct. 31, 1789, died at Rockspring, Ill., March 15, 1858. He received a limited education, and in 1811 removed to Greene co., N. Y. He was licensed to preach in 1812, was ordained at Catskill in 1813, and from 1814 to 1816 was pastor of the Baptist church in Amenia, Dutchess co. In May, 1817, he was set apart as a missionary of the Baptist general convention to the west, went to St. Louis, and for the next nine years was an itinerant missionary in Missouri and Illinois. In 1826 he secured subscriptions in New England and New York to found a literary and theological seminary at Rockspring, giving the lands for it, and he was principal of it in 1830-'31. In April, 1829, he started "The Pioneer," the first Baptist journal published in the west, which he maintained for 10 or 12 years. In 1831, in connection with the Rev. Dr. Going, he originated the American Baptist home mission society. In 1832 he published "The Emigrant's Guide," which led to extensive emigration to Illinois and other northwestern states, and began the publication of a monthly Sunday school paper. In 1834 he published a "Gazetteer of Illinois." In 1835 Shurtleff college was founded by his exertions at Upper Alton, Ill., and the Rockspring seminary transferred to the new institution. Mr. Peck during the year travelled 6,000 miles, and raised $20,000 for the endowment of the college. His next effort was for the establishment of a theological seminary at Covington, Ky. In 1843-'5 he resided in Philadelphia as corresponding secretary and general agent of the American Baptist publication society, and for the next 13 years was a pastor in Missouri, Illinois, and Kentucky. During this period he wrote a life of Daniel Boone for Sparks's "American Biography," and edited the "Annals of the West." He left a journal, which with his correspondence and a memoir was edited by Rufus Babcock under the title "Forty Years of Pioneer Life" (Philadelphia, 1864).

PECOS, a S. W. county of Texas, formed in 1871, separated from Mexico on the south by the Rio Grande, and bounded N. E. by the Pecos river; area, about 11,500 sq. m. It is supposed to contain valuable minerals, but has been little explored. The valleys contain some good farming land, but the county is best adapted to grazing. Capital, Fort Stockton.

PECQUET, Jean, a French anatomist, born in Dieppe about 1620, died in February, 1674. He studied at Montpellier, and while still a student made the most important anatomical discovery of his life, namely, the true course of the lacteal vessels. He found that the mesenteric lacteal vessels terminate in a saccular expansion situated at the upper and back part of the abdomen, next the vena cava and in front of the second lumbar vertebra, now known as the *receptaculum chyli*, or the reservoir of Pecquet; and that the chyle is thence conducted by the thoracic duct to the point where this canal opens into the left subclavian vein. It is said that this discovery did much to induce the acceptance of Harvey's doctrine of the circulation of the blood. Pecquet spent the greater part of his life in Paris, and was one of the first members of the academy of science. His principal works are *Experimenta nova Anatomica* (Paris, 1651), and *De Circulatione Sanguinis et Chyli Motu*, and *De Thoracicis Lacteis* (1654).

PEDEE, Great, a river of South Carolina, which, rising in the N. W. part of North Carolina, at the base of the Blue Ridge, is called the Yadkin until it enters the former state near its N. E. corner. Thence it flows nearly S., falling into Winyaw bay near Georgetown. Among its tributaries in South Carolina are Lynch's creek, and the Little Pedee, Black, and Waccamaw rivers. It is navigable for small vessels to Cheraw, 150 m.

PEDOMETER. See ODOMETER.

PEDRO I. (DE ALCANTARA) of Brazil, and IV. of Portugal, born in the palace of Queluz, near Lisbon, Oct. 12, 1798, died there, Sept. 24, 1834. On the invasion of Portugal by the French in 1807, the royal family fled to Brazil, which was raised to the rank of a kingdom in 1815. After the death of the queen Dona Maria I. the father of Dom Pedro became king of Portugal under the title of John VI., and in 1821 returned to that country, leaving his son as regent of Brazil. When the Portuguese cortes adopted measures reducing Brazil again to the rank of a colony, a revolution took place, and Dom Pedro, placing himself at the head of the movement, was proclaimed protector and perpetual defender of Brazil; and the country being declared independent in October, 1822, he was proclaimed constitutional emperor, and on Dec. 1 was crowned. In 1826, the sovereignty of the province Cisplatina (Banda Oriental) being disputed between Brazil and Buenos Ayres, Dom Pedro declared war against the latter, which terminated unfavorably to his interests. His father dying in 1826, he became king of Portugal, but immediately abdicated in favor of his infant daughter, Dona Maria da Gloria; and a popular tumult in Rio de Janeiro compelled him to abdicate in favor of his son, April 7, 1831, and to return to Portugal, during the usurpation of Dom Miguel. He landed at the island of Terceira, one of the Azores, issued a decree in favor of Dona Maria and began a war which terminated successfully in 1834. (See MIGUEL.) Dom Pedro was appointed regent during his daughter's minority, but he died before it expired. In 1833 he had been excommunicated by the pope for confiscating monastic property in Portugal.

PEDRO II. (DE ALCANTARA), emperor of Brazil, son of the preceding, born in Rio de Janeiro, Dec. 2, 1825. In his sixth year his father abdicated the crown in his favor. During his minority the country was distracted by rival factions; and at length, when Pedro II. was 14 years of age, a bill was passed in the chamber of deputies declaring his majority. Having been declared to have attained his majority, he was crowned July 18, 1841. The disturbed state of the country still continued. Several of the provinces were in arms; in that of São Paulo order was restored by Gen. Caxias; but the war was prolonged in the province of Minas Geraes until the decisive victory of the royalists at San Lucia in 1842. Subsequently the emperor joined with Uruguay against the Argentine dictator Rosas, who was finally overthrown in 1852. For the subsequent events of his reign, see BRAZIL. From August, 1871, to March, 1872, Dom Pedro left the empire under the regency of his daughter, the princess Isabella, and made an extended tour on the continent and in England. Under his rule Brazil is steadily increasing in power, the government has been consolidated, the finances are in a good condition, railways have been built, immigration has been encouraged, slavery abolished, and internal improvements actively carried on. Dom Pedro possesses remarkable literary and scientific acquirements and a liberal turn of mind, and enjoys the enthusiastic affection of his subjects. In March, 1875, he was elected a corresponding member of the French academy of sciences. On Sept. 4, 1843, he married the princess Theresa Christina Maria, daughter of Francis I., king of the Two Sicilies. He has one surviving child, the princess Isabella, born July 29, 1846, and married, Oct. 15, 1864, to Louis, count d'Eu, son of the duke of Nemours.

PEDRO THE CRUEL, king of Castile and Leon, born in Burgos, Aug. 30, 1334, killed March 14, 1369. He succeeded his father Alfonso XI. in 1350, and in 1353 married Blanche de Bourbon, sister of the king of France, but in three days deserted her, and devoted himself to his mistress Doña Maria Padilla, whose relatives he raised to the highest offices. Equally licentious and cruel, he put to death, among many other victims, two of his natural brothers, and poisoned his queen. Finally an insurrection was raised against him under the lead of Henry of Trastamare, his natural brother and rival. At the same time the pope excommunicated the king and laid his kingdom under an interdict. Henry was defeated and driven to France, but in 1365 revived his claim to the throne, in which he was supported by the pope and Charles V. of France. Pedro sought refuge in Bayonne and obtained the assistance of Edward the Black Prince, who placed him again on the throne; but Edward having deserted him in disgust, Pedro was defeated in the battle of Montiel and slain by the hand of his rival, who succeeded him as Henry II.

PEDRO, Dom, duke of Coimbra and regent of Portugal, born in Lisbon, Dec. 9, 1392, killed in battle, May 20, 1449. He was the second son of John I. of Portugal and Philippa of Lancaster, daughter of John of Gaunt. While yet young he was intrusted with the command of the first expedition against Ceuta. He next devoted four years (1424–'8) to travel, visiting all the courts of Europe, and penetrating even to Bagdad. After the death of King Edward (Don Duarte) the people became discontented with the regency of the queen, and Dom Pedro was nominated by the cortes defender and regent of the kingdom, Nov. 11, 1439. He brought about a marriage between his daughter Isabella and the young king, Alfonso V. (1446). A quarrel between himself and his illegitimate brother the duke of Bragança, each claiming the dignity of constable of the kingdom, resulted in civil war. Bragança gained the king to his interest. Pedro having retired to Coimbra, but not daring to sustain a siege, advanced to meet the royal troops with a force of 1,000 horse and 5,000 infantry; and in the battle of Alfarrobeira, May 20, 1449, he was defeated, and killed by an arrow.

PEDROTTI, Carlo, an Italian composer, born in Verona in 1816. He spent several years in Holland, returning to Italy in 1844. His best known opera, *Tutti in maschera*, was first performed in Verona in 1856, and in French under the title *Les masques* in Paris in 1869.

PEEBLESSHIRE, or **Tweeddale,** an inland county in the south of Scotland, bordering on the counties of Edinburgh, Selkirk, Dumfries, and Lanark; area, 319 sq. m.; pop. in 1871, 12,330. It is watered by the Tweed. The great part of the surface consists of mountain, moor, and bog; the mountains vary in height from 2,400 to 2,740 ft. Coal and limestone abound. There are manufactories of woollens. Capital, Peebles, on the Tweed, 20 m. S. of Edinburgh; pop. in 1871, 3,160.

PEEKSKILL, a village in the town of Cortland, Westchester co., New York, on the E. bank of the Hudson river, 43 m. above New York city; pop. in 1870, 6,560. There are frequent trains on the Hudson River railroad to New York, and in summer steamers to and from that city touch here. The village is the market centre of an extensive farming country, but the chief business is the manufacture and working of iron. There are six iron founderies, producing chiefly stoves, and a large blast furnace. At Verplanck's Point, just below, bricks are extensively manufactured. Peekskill has two large public schools; several private institutions of learning, of which the principal are the Peekskill academy, the New York scientific school, and St. Gabriel's school (Episcopal) and the seminary of Our Lady of Angels (Roman Catholic) for young ladies. There are a national bank, a savings institution, two weekly newspapers, and 11 churches, viz.: Baptist, Episcopal, Friends' (2), Methodist (2), Presbyterian (2), Reformed, Roman Catholic, and one for colored people. Peekskill was incorporated in 1816.

PEEL, a S. county of Ontario, Canada, on the N. shore of Lake Ontario; area, 468 sq. m.; pop. in 1871, 26,011, of whom 13,147 were of Irish, 8,302 of English, and 3,590 of Scotch descent. It is traversed by the Grand Trunk, the Great Western, and the Toronto, Grey, and Bruce railways. Capital, Brampton.

PEEL. I. Sir **Robert,** an English manufacturer, born at Peel's Cross, near Lancaster, April 25, 1750, died at Drayton Manor, Staffordshire, May 3, 1830. He inherited a moderate property from his father, a cotton spinner, and in 1773 entered into partnership with William Yates, a cotton manufacturer of Bury, Lancashire, whose daughter he married in 1783. By industry, activity, enterprise, and sagacity, he amassed a fortune before reaching middle life; but he continued to conduct business as a manufacturer for many years with uninterrupted prosperity. In 1803 he had more than 15,000 persons in his employ. In 1780 he published a pamphlet entitled "The National Debt productive of National Prosperity;" and in 1790 he was returned to parliament as one of the members from Tamworth, a constituency which he continued to represent till 1820. He was a stanch supporter of Pitt and the tories. During the alarm caused by the threatened invasion of the French he was active in the formation of volunteer corps, and raised among his own workmen a regiment, of which he was appointed lieutenant colonel. In 1800 he was created a baronet. He left property, real and personal, estimated at more than two millions sterling, the greater part of which, after liberal provisions for his numerous family, was settled on his eldest son. **II.** Sir **Robert,** an English statesman, eldest son of the preceding, born near Bury, Lancashire, Feb. 5, 1788, died in London, July 2, 1850. He was educated at Harrow, and at Christ Church, Oxford, and graduated in 1808, taking the honors of a double first class—first in classics and first in mathematics. In 1809 he was returned to parliament for the Irish borough of Cashel, and entered public life as a tory. In 1810 he seconded the address in reply to the king's speech, and in 1811 was appointed under secretary of state for the colonies. In September, 1812, he was appointed chief secretary for Ireland. In the then disturbed political condition of that country his high tory principles and opposition to Catholic emancipation made him obnoxious to the ultra Roman Catholics, who seldom called him by any other appellation than "Orange Peel." O'Connell singled him out for attack, and for the virulence of his language was challenged by Peel, who went to the continent to afford his adversary a hostile meeting; but the duel was prevented by the arrest of O'Connell in London. His most important act in Ireland was the establishment of the regular Irish constabulary, nicknamed the "Peelers," which was the first step toward the introduction of that system of metropolitan police now familiar to every considerable town of Great Britain. In 1817 he was returned to parliament for the university of Oxford; in 1818 he resigned his Irish secretaryship, and as chairman of the bullion committee he introduced in 1819 the bill authorizing the return to cash payments which bears his name. It brought upon him no slight odium, and was the first political act in which his father, who still held his seat in parliament and was a stanch supporter of Pitt's currency doctrines, differed from him. In 1822 he succeeded Lord Sidmouth as home secretary, and during his term of office procured the passage of an important series of acts reforming and remodelling the criminal law. On the dissolution of the Liverpool ministry in 1827 he retired from office; but on the accession of the tory government of the duke of Wellington in 1828, he resumed the seals of the home department. The agitation of the repeal of the penal laws affecting the Roman Catholics had now reached a point which compelled the ministry either to consent to the measure or to resign office; and in a speech delivered in March, 1829, Mr. Peel, yielding to what he considered the exigencies of the moment, proposed Catholic emancipation. The orthodox tories at once denounced him as an apostate; and on offering himself to the electors of Oxford university, his seat for which he had resigned on becoming a convert to emancipation, he was defeated. But he was temporarily returned for the borough of Westbury, and in 1830 became one of the members for Tamworth, which constituency he represented until his death. He retired with his colleagues in November, 1830. In the first session of the reformed parliament he found himself at the head of a small party which under his guidance was developed into a compact, powerful, and well disciplined opposition. In 1834, on the dissolution of the Melbourne ministry, he was summoned from Italy to form an administration. For several months he struggled against a formidable opposition, but was obliged in April, 1835, to retire. For six years he remained in opposition, having within that time declined to form a cabinet; and in September, 1841, he became premier as first lord of the treasury, with a large and well organized majority in both houses. His ministry, formed on protectionist principles, partially adopted free-trade doctrines under the pressure created by the anti-corn-law league; and Peel inaugurated in 1842 a more liberal financial policy by removing the duties on certain articles and abating them on breadstuffs and raw materials of manufacture. At the same time an income tax for three years was imposed, by which the government was enabled to repeal upward of £12,000,000 of indirect taxes. In 1845 this tax was renewed for three years; and in 1846, in view of the approach of famine in Ireland, the premier carried a total abolition of duties on breadstuffs. This brought upon Sir Robert a large degree of odium among the agricultural classes. A coalition of the protectionists and the whigs, the former led by Disraeli and Lord George Bentinck, overthrew him on the Irish coercion bill, and on June 29, 1846, he resigned. He spoke for the last time in parliament on June 28, 1850, in opposition to Lord Palmerston's foreign policy, as exemplified in the Greek question. On the succeeding day he was thrown from his horse, and died of his injuries after great suffering. He had declined a peerage and the order of the garter, and left in his will a solemn injunction to his children against the acceptance of such honors. He left five sons and two daughters.—See *Sir Robert Peel*, by Guizot (Paris, 1859), and "Sir Robert Peel, a Historical Sketch," by Henry Lord Dalling and Bulwer (London, 1874).—His sons Sir ROBERT (born May 4, 1822) and FREDERICK (born Oct. 26, 1823) have been prominent as members of parliament and incumbents of various executive offices. The latter was made a privy councillor in 1857 and the former in 1866.

PEELE, George, an English dramatist, born in Devonshire about 1553, died about 1598. He graduated at Broadgates hall, now Pembroke college, Oxford, in 1579, subsequently settled in London, and became a writer for the theatre, an occasional performer, and an intimate associate of Nash, Marlowe, and Greene. Six dramas by him, comprising probably not more than half of his works of this class, have been collected by Mr. Dyce, together with poems and miscellaneous writings (3 vols., 1828–'39). His best play is "The Love of King David and fair Bethsabe, with the Tragedy of Absalom."

PEER (Lat. *par*, equal; Fr. *pair*), a term originally applied, in the feudal law, to all the vassals of the same lord, because, whatever might be their relative condition, they were all equally his vassals, and bound to render their feudal service in his courts or in war. It is now applied sometimes to those who are impanelled in an inquest for trial of any person; for they are not only peers with each other, as having equal power and an equal duty, but by the common law of England every man is to be tried "by his peers." In the United States this principle has no practical application, as all are equal in law where no one has any legal rank. In England the word is most commonly used to designate a lord of parliament, all of whom are called the "king's peers," not because they are in any sense equal with the king, but because they constitute his highest court, and because, whatever may be the degree of their nobility, all, as nobles, are equal in the discharge of their official duty, as in their votes in parliament, or upon the trial of any person impeached by the commons; and all share alike in all the privileges of the peerage. The different degrees of English nobility are, in the order of precedence, duke, marquis, earl, viscount, and baron. The eldest son of the first three is usually called by his father's second title, and their other sons by the term lord prefixed to their family names. These titles are called titles of courtesy, their bearers having no legal right to them. The sons of a viscount are called honorable. In the British empire there are five classes of peerage: of England, of Great Britain, of the United Kingdom, of Scotland, and of Ireland. Members of the first three classes, called peers of the realm, hold seats in the house of lords by hereditary right; those of the last two only by election as representatives of their order. (See PARLIAMENT.) A peeress is a woman who is noble by descent, by creation, or by marriage. A peeress by descent or by creation retains her title and nobility in law, although she marries a commoner; but a peeress by marriage loses her nobility by her marriage with a commoner, though she commonly retains her title in society as a title of courtesy. It is one of the privileges of the peerage of the realm not to be liable to arrest for debt. This rule applies equally to peeresses, who are peers of the realm, and can only be tried by their peers, although they cannot sit in parliament or on trials.—In France, as a kingdom and an empire, the word *pair* remained in use through all the governments from feudal times; but the functions and privileges of the peerage varied very much at different times, the term being destitute of the definite meaning which it has attained in England. Louis XVIII. in 1814 established a house of lords (*pairs*), or more accurately a peerage, in some degree resembling the English system; but Villèle, the minister of Charles X., created at one time 76 new peers, when he wanted them for a political purpose.

PEET, Harvey Prindle, an American instructor of the deaf and dumb, born in Bethlehem, Litchfield co., Conn., Nov. 19, 1794, died in New York, Jan. 1, 1873. He graduated at Yale college in 1822, and became an instructor in the asylum for the deaf and dumb at Hartford, of which he was soon appointed steward. In 1831 he was appointed principal of the institution for the deaf and dumb in New York. For some years he acted as principal, superintendent or steward, teacher and chaplain, as well as secretary of the board of directors, and managed all the details of the institution. The want of suitable elementary books led him to prepare a series which are now in general use. In 1868 he resigned, and was succeeded by his son, Isaac Lewis Peet.

PEGASUS, in Grecian mythology, a winged horse which sprang from Medusa when Perseus killed her for having intercourse with Neptune. His place, according to the most ancient writers, was in the palace of Jupiter, whose thunderbolts he carried; but others place him among the stars as the horse of Aurora, or represent him as the horse of the Muses, who with his hoof produced the inspiring fountain Hippocrene on Mt. Helicon. He plays a part in the myth of Bellerophon and Chimæra, having been bridled by the former with a golden bridle received from Minerva, or according to some by the goddess herself.

PEGU. I. A division of British Burmah, including the districts of Rangoon, Bassein, Myanoung, Prome, and Toungoo, bounded N. by the Burmese empire and the division of Aracan, E. by Tenasserim, S. by the gulf of Martaban, and W. by Aracan and the bay of Bengal; area, 36,454 sq. m.; pop. in 1871, 1,533,505. The most important towns are Rangoon, Martaban, Pegu, and Prome. The whole province is intersected by branches of the Irrawaddy. The Sittoung waters the eastern parts; and both these rivers are navigable by vessels of considerable size to distances far beyond the limits of Pegu. The Aracan-Yoma mountains, along the W. frontier, attain a height of from 3,000 to 6,000 ft. The minerals include iron, tin, lead, and precious stones. The climate is warm and moist, but is not unhealthy. The soil is fertile, and vegetation is luxuriant. Much of the surface is covered with valuable forests, and the agricultural districts of the Irrawaddy are the most productive and populous in the country. The principal productions consist of rice, timber, particularly teak, gums, ivory, and various woods used in dyeing.—Pegu was formerly an independent kingdom, but after a series of contests, extending over many ages, it was conquered by the Burmese assisted by the Portuguese. The Peguans revolted about the middle of the 18th century, subdued the Burmese, and made their king prisoner. A long series of wars followed, in which the Burmese were assisted by the English and the Peguans by the French; and the former at length became masters of the country. In 1824 war broke out between the British and Burmese, and among other provinces Pegu was conquered, but restored at the conclusion of hostilities in 1826. The imprisonment of the master of a ship, and some other British subjects, by the governor of Rangoon, led to a second war in 1852, which resulted in Pegu being annexed to the English possessions in India, and with Aracan and Tenasserim it was constituted the province of British Burmah in 1862. (See BURMAH, BRITISH.) **II.** A town in the above described division, on a river of the same name, which falls into a branch of the Irrawaddy, 58 m. N. of Rangoon; pop. about 15,000. The streets are broad and regular, and paved with bricks, and the houses are built of wood and elevated on posts. There is a remarkable pyramidal pagoda, built of brick, octagonal at the base, each side measuring 162 ft. Pegu, said to have formerly contained 150,000 inhabitants, was destroyed by the Burmese in 1757. It was captured by the British in June, 1852. The population is increasing.

PEHLEVI LANGUAGE. See IRANIC RACES AND LANGUAGES, and ZEND-AVESTA.

PEI-HO, or North River, a river of China, which rises near the Mongolian frontier, about lat. 41° N., lon. 115° 30′ E., and after a general S. E. course of about 350 m. flows into the gulf of Pechili in lat. 38° 30′, lon. 117° 47′. Near the mouth of the river are the villages of Taku and Siku, and a little higher up Tangku, and in the immediate vicinity are widespread settlements estimated to contain 500,000 inhabitants; but the most important town on the Pei-ho, and the largest port N. of Shanghai, is Tientsin at the junction of the grand canal, about 70 m. from the sea, and the head of steam navigation. Tungchow, where all the boats land their passengers and cargoes for Peking, is 110 m. higher up, or by the sinuosities of the river 180 m. from Taku. The principal affluent of the Pei-ho is the Hoen-ho. On a small tributary, the Tunghui, 12 m. from the main stream, is Peking. It is estimated that the river and its affluents drain an area of about 200,000 sq. m. The velocity of the stream, arising from the great altitude of its source, has scoured out a narrow channel through the deep alluvial plain of Chihli or Pechili, and cut into the substratum of clay. For the last 5 m. of its course the plain is little if at all above the level of high water at spring tides, and the river discharges itself over an extensive bar formed of tenacious clay, and the distance at low water from a depth of 10 ft. without to 10 ft. within is nearly 4½ m. In the channel leading over the bar there is a depth of 11 ft. at high water; but at low water there is only 24 in. in most places, and extensive dry mud banks on either hand. Within the bar the channel winds upward for about a mile between steep mud banks, which are covered at high water, and render navigation at that time very dangerous. At this distance the banks become covered with reeds, the breadth is about 100 yards, and the current runs from 2 to 3 m. an hour. Forts and earthworks have been erected upon natural or artificial mounds with an altitude of from 10 to 12 ft. at high water, and, from the peculiar configuration of this reach, face and flank it on all sides.—In an engagement between English and French gunboats and land forces and the Chinese at the mouth of the Pei-ho, on May 19, 1858, the Chinese were defeated. Another attack was made on the forts, June 25, 1859, chiefly by 11 English gunboats, manned by 500 men, with 700 marines, when the English were repulsed with a loss of 89 killed and 345 wounded. On Aug. 21, 1860, the attack was renewed with an English and French fleet of 300 sail and a land force of 25,000 men. The Chinese fortifications were captured and destroyed. The English lost 19 killed and 182 wounded; the French, 30 killed and 160 wounded; the Chinese loss was estimated at 3,000.

PEINE FORTE ET DURE. Formerly, in England, when a prisoner indicted for a capital felony or petit treason stood mute, as the phrase was, upon his arraignment, that is, refused to plead and so to put himself upon his trial in the mode which the law prescribed, answering either not at all or impertinently to the charge preferred against him, he was condemned to the punishment of *peine forte et dure.* It wrought a forfeiture of goods, but no attainder and corruption of blood, and therefore no escheat of lands. The *peine forte et dure* was an infliction of extreme severity. The prisoner was carried back to prison, and laid in some low, dark room, almost naked, upon his back; his body was burdened with very heavy weights; he received once each day a portion of the meanest bread or water, of bread one day and of water the next, and so on alternately; and thus he continued until he died. In early times, it is supposed, the torture lasted only until the prisoner declared himself willing to plead; but later, says Hawkins, he could not save himself, if once the punishment had been ordered. Women were subjected to the same torture.—It is matter of dispute how and when *peine forte et dure* was introduced; whether it existed at common law, or was created by legislative provision. The statute Westminster the first, c. 3, enacted in the time of Edward I. (and there is no mention of this penalty before that reign), says that felons standing mute shall be put in *prison forte et dure;* and as it does not explain these words at all, it seems to imply that their meaning was already familiar in practice. This is the opinion of Sir Edward Coke and Sir Matthew Hale, but Blackstone thinks that the punishment had a statutable origin. The penalty of *peine forte et dure* was not abolished until the 12th year of the reign of George III. (1772). It was doubtless for the purpose of extorting a plea and of securing their escheats and forfeitures, that the feudal lords devised this penalty. Generally, no doubt, the device accomplished its end; though there were instances of persons who suffered death in this mode in order to preserve their estates to their families. The statute 12 George III., c. 20, prevented further need of this harsh coercion, by providing that, if any person thereafter should stand mute on his arraignment, he should be convicted of the felony charged, and judgment and its consequences should follow in the same manner as if such person had been convicted by verdict or confession of the felony charged against him.—The only instance, so far as we are aware, in which *peine forte et dure* has been inflicted in this country, was when in Massachusetts, in 1692, Giles Cory, 80 years old, the husband of a reputed witch, stood mute upon his trial, and was condemned to be pressed to death.

PEIPUS, Lake, or **Tchudic Lake,** a lake of European Russia, bounded by the governments of Esthonia, St. Petersburg, Pskov, and Livonia; extreme length 90 m., extreme breadth 30 m.; area about 1,500 sq. m. The southern part is connected with the northern by a strait, and is sometimes called Lake Pskov, the town of that name being situated at its S. E. extremity. There are several small islands at both ends of the strait. Peipus receives the river

Embach from the west, the Velikaya from the southeast, and the Sheltcha from the east; and the Narova flows about 50 m. to the gulf of Finland from the N. E. end. The shores are low and marshy, and the greatest depth is about 60 ft.

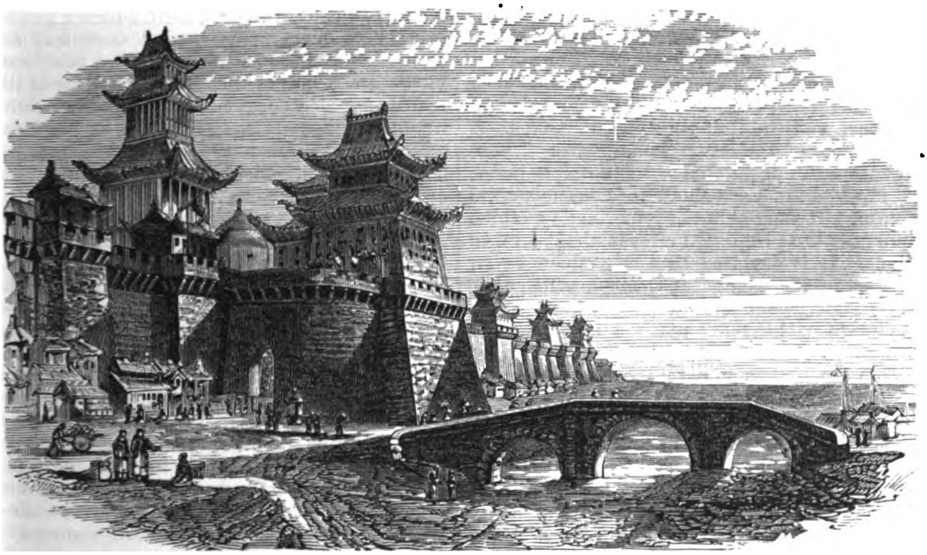
PEIRCE, Benjamin, an American mathematician, born in Salem, Mass, April 4, 1809. He graduated at Harvard college in 1829, became tutor in mathematics there in 1831, university professor in mathematics and natural philosophy in 1833, and Perkins professor of astronomy and mathematics in 1842, which office he still holds. In 1849 he was appointed consulting astronomer to the "American Ephemeris and Nautical Almanac." In 1855 he was one of the scientific council to which was intrusted the organization of the Dudley observatory. In 1867 he succeeded Prof. Bache as superintendent of the coast survey, which office he resigned in 1874. While he was a pupil of Dr. Bowditch he read the proof sheets of the translation of the *Mécanique céleste.* He was a contributor to the "Mathematical Miscellany," and undertook the publication of the "Cambridge Miscellany of Mathematics, Physics, and Astronomy," of which only five numbers appeared. In this he gave his celebrated discussion of the motion of a top spinning on a plane surface. Between 1836 and 1846 he prepared a series of mathematical text books, which are used in Harvard college. It was also principally through his efforts that the observatory of the college was constructed and equipped. His paper on the discovery of Neptune ("Proceedings of the American Academy of Arts and Sciences," vol. i., p. 341) excited the attention of astronomers and mathematicians in both Europe and America. In that paper he demonstrated that the mass, the distance from the sun, and other characteristics of the real planet were entirely different from those which were assumed by Leverrier and Adams in their computations, and that the discovery of the planet by Galle nearly in the position pointed out by Leverrier was due to an accidental concurrence of circumstances rather than to the correctness of the mathematical hypotheses. Prof. Peirce followed up this announcement with a thorough discussion of the mutual influences of Uranus and the real Neptune which formed the basis of the true theory of the planet. In June, 1851, and September, 1855, he published in Gould's "Astronomical Journal" papers on the constitution of Saturn's rings, in which, taking up the problem almost where it had been left by Laplace, he discussed the conditions of statical equilibrium of a transverse section of a ring, concluding that if the system be composed of separate rings moving as a whole, each ring must be very narrow; so that there must be a great number of rings, each moving with a different velocity. He also showed that no ring could sustain itself in stable equilibrium about a primary without the attraction of properly arranged satellites, and no solid ring under any circumstances. In 1852 Prof. Peirce prepared a volume of lunar tables for the use of the American "Nautical Almanac," and they were employed in the almanac office as the basis of all computations into which the place of the moon enters. In 1857 appeared his "Treatise on Analytic Mechanics" designed to form one of a series of four treatises, the others being respectively upon "Celestial Mechanics," "Potential Physics," and "Analytic Morphology." Among his important investigations are his theory of the tails of comets, showing the mode and laws of their formation; his methods of investigating terrestrial longitudes and the form of the moon's limb by means of occultations of the Pleiades; his researches upon personal equation, showing the existence and means of measurement of a new and before unrecognized form of personal error, in observations "by eye and ear;" and the "Criterion for the Rejection of Doubtful Observations." He has also investigated the forms of equilibrium of an elastic sac containing a fluid, researches which led to his theory of analytic morphology; the phyllotactic series of numbers; and the cyclic solution of the "school-girl puzzle." His most recent work is entitled "Linear-Associative Algebra" (Washington, 1870); for which see MATHEMATICS. He received the degree of LL. D. from the university of North Carolina in 1847, and from Harvard college in 1867, was elected an associate of the royal astronomical society of London in 1849, and a member of the royal society of London in 1852. He was president of the American association for the advancement of science in 1853, was one of the original members of the national academy of sciences, and is a member of many other learned societies in Europe and America.

PEIRCE, Bradford Kinney, an American clergyman, born in Royalton, Vt., Feb. 3, 1819. He graduated at Wesleyan university in 1841, was received into the New England Methodist Episcopal conference in 1843, served as pastor in Waltham, Newburyport, and Charlestown, Mass., and in 1847 removed to Boston to edit the "Sunday School Messenger" and the "Sunday School Teacher." In 1855-'6 he was a state senator, and his efforts in behalf of public charities led to the establishment of the state industrial school at Lancaster, of which he was superintendent and chaplain. He was chaplain of the house of refuge on Randall's island, N. Y., from 1863 to 1872, when he returned to Boston to become editor of "Zion's Herald." He has published "Notes on the Acts," "Bible Scholar's Manual," "The Eminent Dead," "Trials of an Inventor" (1866), "The Word of God Opened" (1868), and "A Half Century with Juvenile Delinquents" (1869).

PEKIN, a city and the county seat of Tazewell co., Illinois, on the left bank of the Illinois river, navigable by steamboats for eight months of the year, 55 m. N. of Springfield;

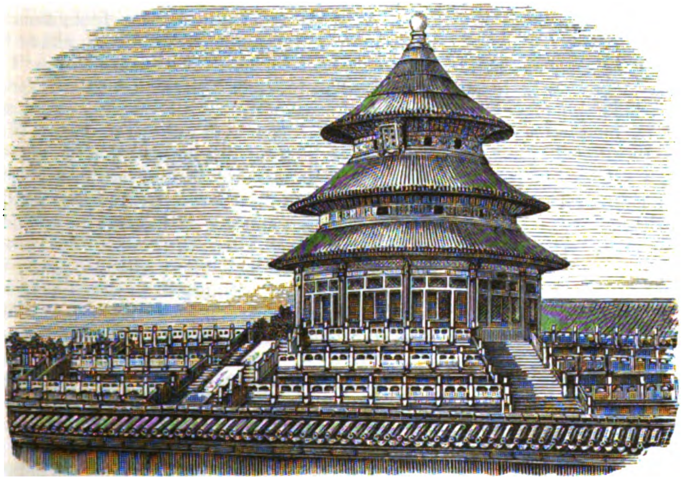
pop. in 1850, 1,678; in 1860, 3,467; in 1870, 5,696; in 1875, estimated by local authorities at 8,500. The surrounding country is fertile and abounds in coal. The streets are lighted with gas and lined with shade trees. There are many elegant residences, large and costly school buildings, and a fine court house. The fair grounds are worthy of mention. The following railroads meet at this point: the Peoria, Pekin, and Jacksonville; the Indianapolis, Bloomington, and Western; the Chicago, Pekin, and Southwestern; and the Toledo, Wabash, and Western. The trade is important. There are two elevators, at which about 1,400,000 bushels of corn are handled annually; two wholesale ice houses, shipping ice to St. Louis and to all parts of southern and central Illinois; a pork-packing establishment; the shops and offices of the Peoria, Pekin, and Jacksonville railroad; two breweries, three flour mills, two founderies, three distilleries producing 1,422,149 gallons of alcohol and highwines in 1874, and manufactories of wagons and agricultural implements. The city contains three private banks, six hotels, graded public schools, a library, a daily and two weekly newspapers, and six churches, viz.: Baptist, Episcopal, Methodist (2), Reformed, and Roman Catholic.

PEKING, or **Pekin** (Chinese, *Pe-ching*, northern capital), the capital of the Chinese empire and of the province of Chihli, near the river Tunghui, a small tributary of the Pei-ho, in lat. 39° 56′ N., lon. 116° 27′ E., about 12 m. from the Pei-ho, about 35 m. from the nearest part of the great wall, and 85 m. N. W. of the gulf of Pechili; pop. estimated at 1,500,000. It stands on an extensive sandy plain, and consists of Kin-ching, the prohibited city, containing only the palaces of the emperor and the dwellings of his immediate retainers; Hwang-ching, the imperial city, with a large number of court officials; Nui-ching, the Tartar city, area 12 sq. m.; and Wai-ching, the Chinese city, area 15 sq. m. The Tartar city is surrounded by a wall 60 ft. high, about 50 ft. thick at the base and 40 ft. at the top; and the Chinese city by one 30 ft. high, 25 ft. thick at the base, and 12 ft. at the top. They are built of earth or rubble, faced with stone or brick, laid in cement, with sloping embankments at intervals to enable horsemen to ascend to the top, and square buttresses at distances of about 60 yards. Outside the walls the suburbs include with the cities an area nearly 25 m. in circumference. The cities are entered by 13 external gates; and there are three from the Tartar city into the Chinese, which are closed from sunset to sunrise.—The inner area, Kin-ching, or prohibited city, has a circumference of about 2 m. It is entered by four gates, each surmounted by a tower. The interior is divided into three parts by walls running from N. to S., and the whole is occupied by a suite of courtyards and apartments superior to any other buildings of the kind in China. The Meridian gate leads to the imperial buildings, and is reserved for the use of the emperor. When his troops return in triumph, the prisoners they bring are here presented to him; and here the presents he confers on vassals and ambassadors are bestowed with great pomp. Passing through this gate into a larger court, over a small creek spanned by five marble bridges ornamented with sculptures, a second court is entered, paved with marble and terminated on the sides by gates, porticoes, and pillared corridors. At the head of this court is a marble structure 110 ft. high, called the



The Western Gate.

"gate of extensive peace." Here the emperor, on New Year's day, his birthday, and other occasions, receives the homage of his courtiers assembled in the court below; five flights of stairs decorated with balustrades and sculptures lead up to it, and five gates open through it into the next courtyard. Beyond it are two halls, one where his majesty examines the implements used in the annual ploughing, and the other where he feasts guests and other distinguished persons on New Year's day. After ascending a stairway and passing another gate, the Kien-tsing-kung, or the "tranquil palace" of heaven, is reached, into which no one can enter without special permission. In it is the council chamber, and here candidates for office are presented to the sovereign. It is the most magnificent of all the palaces. Beyond it stands the "palace of earth's repose," where the empress rules her miniature court in the imperial harem; and between this and the N. wall is the imperial garden, adorned with elegant pavilions, temples, and groves, and interspersed with canals, fountains, artificial lakes, and flower beds. In the E. division are the offices of the cabinet and the treasury. North of these is the "hall of intense thought," where sacrifices are offered to Confucius and other sages; and near this is the library. At the N. end of the E. division are numerous palaces and buildings occupied by princes of the blood and their connections; and in this quarter is situated the Fung-sien-tien, a small temple where the emperor comes to bless his ancestors. The W. division contains a great variety of edifices devoted to public and private purposes, among which may be mentioned the hall of distinguished sovereigns, statesmen, and literati, the printing office, the court of comptrollers for regulating the receipts and disbursements of the court, and the Ching-hwang-mian, or guardian temple of the city. The number of people within the prohibited city is not very great, and most of them are Mantchoos.—The second enclosure, Hwang-ching or imperial city, which surrounds the prohibited city, is about 6 m. in circuit. It is enclosed by a wall about 20 ft. high, entered by four gates, through which none may pass without special permission. From the "gate of heavenly rest" a broad avenue leads up to the prohibited city; in front of it, outside the wall, is an extensive enclosure having an entrance from the south through which no one is permitted to pass except on foot. On the right of the avenue is a large collection of buildings surrounded by a wall, where offerings are presented before the tablets of deceased emperors and empresses, and worship is performed by the members of the imperial family and clan to their forefathers. Upon the opposite side of the avenue is the altar of the gods of the land and grain, where in spring and autumn the emperor alone makes offerings to these divinities, who are supposed to have been originally men. On the E. side is a depository of military stores, with workshops for their manufacture. The establishment of the Russian college lies N. of this gate; and in the N. E. part of this side are the residences of the lamas, with numerous temples, monasteries, and other religious edifices. Much of this quarter is occupied by dwelling houses and by temples dedicated to various inferior gods in Chinese mythology. On the N. side, surrounded by a wall, is the King-shan, or artificial mountain, about 150 ft. high, with five summits, each of which is crowned by a pavilion. Various kinds of trees border its base and line the paths leading to the tops, and the enclosure contains numerous animals and birds. The W. part is chiefly occupied by a park, with an artificial lake, more than a mile long and with an average breadth of 220 yards, in the centre, which is crossed by a marble bridge of nine arches, and its banks are shaded by groves of trees under which are well paved walks. There are many artificial hills of rockwork, groves, gardens, and parterres. On the S. E. side of the lake is a large summer house consisting of several edifices, partly in or over the water. On the W. side is the hall for the examination of military candidates, where the emperor in person witnesses their exhibitions of equestrian archery. At the N. end of the lake is a bridge leading to an islet, the centre of which presents the aspect of a hill of gentle ascent covered with groves, temples, and summer houses, and surmounted with a tower from which an extensive view of the metropolis is obtained. Near the N. E. end of the park is a temple dedicated to Yuen-fi, the reputed discoverer of the silkworm, near which a plantation of mulberry trees and a cocoonery are maintained. In the neighborhood of the "temple of great happiness," on the borders of the lake, is a gilded copper statue of Buddha, 60 ft. high, with 100 arms.—The third or outer enclosure surrounding the imperial city is the Tartar city, and consists of several wide streets crossing each other at right angles. The principal government offices are situated along the avenue leading S. from the imperial city to the Chinese city. The board of punishments, with its subordinate departments, the censorate, the astronomical board, the medical college, the national academy, and the colonial office are also on this avenue. Near the colonial office is the temple where the nearest ancestors of the reigning family are worshipped by his majesty and the princes of his family on the first day of every month. The observatory, or "hall of science," erected in 1680, is in the S. E. portion, partly upon the wall. It was originally superintended by the Roman Catholic missionaries, but is now under the care of Chinese astronomers, and is entirely neglected. Close to it is the hall of literary examinations. The Russian church of the Assumption is in the N. E. corner, and near it is the splendid "temple of eternal peace" belonging to the lamas who teach Chinese and Mantchoo pupils the Thibetan language; and there is a similar college for the Chinese and Mantchoo languages. The Tartar city is under the control of the general of the nine gates, who is responsible for the peace and good order within its limits; the post is conferred only on Mantchoos. Near his headquarters is a high tower containing an immense bell and drum which announce the hours of the night. A large number of Mohammedans, whose ancestors were from Turkistan, reside near the S. W. corner of the imperial city, where they have a mosque. South of this stands the "church of heaven's Lord," with a convent attached to it, which the Jesuits and Portuguese built during the time of their influence, but which is now going to decay. There are thus religious edifices in the Chinese metropolis appropriated to the Roman Catholic, Greek, and Protestant churches, Islamism, Buddhism in its principal forms, rationalism, ancestral worship, and state worship, and temples dedicated to Confucius and other deified mortals, besides a great number in which the popular idols of the country are adored. Among them is the temple where the tablets of the kings and emperors of former dynasties are collectively worshipped, with the exception of a few who have been excluded on account of their wickedness. Near this is the white pagoda temple, so called from a costly obelisk near it erected by Kublai Khan in the 13th century, and rebuilt and exquisitely ornamented in 1819. Around the edifice are 108 small pillars on which lamps are burned in honor of Buddha. Outside of the city, on the east, is the "temple of heaven," which covers a large area and is surrounded with many spacious buildings; on the west is a corresponding structure called the "temple of earth;" both of these are connected with the state religion. The total number of the Christian population is estimated at 30,000. The Roman Catholic church has here a vicar apostolic. In 1870 there were 38 American and English Protestant missionaries, who were conducting Sunday and day schools and a hospital.—The Chinese city is more populous than the Tartar, but it contains few edifices of importance, is not so well built, and the walls are not so solid. The principal streets are more than 100 ft. wide, and extend between gates at opposite sides of the city; but those which branch off from the chief thoroughfares are mere lanes. They are generally unpaved, and according to the state of the weather are either knee-deep with mud or covered with dust. The houses are of brick, and seldom exceed one story. They are roofed with tiles; and most of the private residences have a parapet wall in front, upon which pots containing flowers and shrubs are placed. In the back streets the edifices are miserable, but in the principal thoroughfares many of them, particularly the shops, are highly ornamented with painting and gilding. The shops are open in front, and the goods are exposed in heaps outside the doors. At each side of the establishment there is generally a wooden pillar or signboard, higher than the housetop, bearing inscriptions in gilt letters setting forth the superior qualities of the wares and the probity of the dealer. Flags and streamers are hung out from these posts, and lanterns of different material and form are arranged with great ingenuity and taste. Notwithstanding the breadth of the main streets, they are much obstructed by the wares exposed outside the shops, and the number of occupations that are carried on in tents and in the open air in movable workshops. Where the main streets intersect, very curious monuments bearing some resemblance to triumphal arches are erected in honor of distinguished individuals. On the E. side of the avenue which leads from the S. gate of the Tartar city, and adjoining the outer gate, stands the altar to heaven, consisting of three stages, each 10 ft. high, and respectively 120, 90, and 60 ft. in diameter, paved with marble and protected with balustrades. Within the enclosure is also the "palace of abstinence," where the emperor fasts three days preparatory to offering the annual sacrifice at the winter solstice. On the opposite side of the avenue is the altar to earth, dedicated to the supposed inventor of agriculture; it stands in an enclosure about 2 m. in circumference, and in reali-



Temple of Heaven.

ty consists of four separate altars: to the spirits of the heavens, those of the earth, the planet Jupiter, and Shin-nung, the inventor of agriculture. The worship at this altar is performed at the vernal equinox, at which time the ceremony of ploughing a part of the enclosure is performed by the emperor, assisted by members of the board of rites. A little W. of this enclosure is the pool dedicated to the spirits of the waters, where his majesty performs special supplications whenever the country suffers from drought or deluge. The southern city is not subject to the same strict military rule as the northern, and is in consequence resorted to by many persons in quest of relaxation and dissipation. During the night the great thoroughfares are usually quiet, and are dimly lighted by lanterns which hang from the doors of the houses. The air is polluted by the stench arising from private vessels and public reservoirs for urine and all kinds of offal, which is carefully collected and carried out of the gates in the same boxed carts in which the vegetables are brought to market. Covered carts without springs drawn by mules, saddle horses, and donkeys are used, and can be hired at numerous stands throughout the city; but sedans are not permitted to be used so near the emperor except by privileged persons. The Mantchoo women ride astride, and their number in the streets, both riding and walking, imparts a peculiarity to the crowd which is not seen in cities further south. The various tribes of central Asia have representatives among the throng, and their different costumes add to the liveliness of the scene.—The climate of Peking is very cold in winter. The thermometer then ranges from 25° to 10°, and in summer it sometimes rises to 105°, but is generally between 75° and 90°. Water is frozen from December to March, and violent storms and whirlwinds occur in spring. But upon the whole the climate is healthy, and epidemics are rare.—The manufactures of Peking are trifling, and the trade of the place is confined to supplying the wants of the inhabitants. The principal part of the provisions consumed comes from the S. provinces, or from the N. part of Chihli, the plain adjoining the city producing but little. The taxes of China are for the most part paid in kind, and large quantities of grain are stored in Peking. Coal is brought from the south and southwest on the backs of camels and mules; and the houses are heated by stoves, the fuel being a compound of coal dust and earth. All the necessaries of life are exceedingly dear, and many of the inhabitants are miserably poor.—The government differs from that of other cities in the empire; it is separated from the affairs of the department, and administered by officers residing in the four circuits into which it is divided. A minister of one of the boards is appointed superintendent of the city, and subordinate to him is a mayor. These functionaries are quite independent of the provincial governor, carrying any affairs which they cannot determine directly to the emperor. The police is materially assisted in its duties by the gates which are placed at the heads of the streets and closed at night, and watchmen patrol the city. There is frequently much trouble in keeping the populace quiet, for in times of unusual scarcity they rise in mobs and pillage the public granaries. There is a government journal, the "Peking Gazette," published daily in the form of a pamphlet of from 60 to 70 pages. Everything printed in it is first examined by a political or literary committee, and the official part emanates from the emperor's cabinet. It notices all public affairs, and gives a succinct account of the principal events. It contains the petitions and memorials presented to the emperor, together with his replies and his orders and instructions to the mandarins. Records of judicial events conclude the official part, which the editors cannot alter in any respect, without subjecting themselves to the penalty of death. Examples of this punishment, occurring from time to time, maintain among the public an almost religious respect for all that appears in the "Gazette." The journal is regarded as an expression of the emperor's will, which every one obeys, and before which every one bows.—The environs of Peking are occupied with groves, private mansions, hamlets, and cultivated fields, in or near which are trees, so that the city viewed from a distance appears as if situated in a forest. The park of Yuen-ming-yuen, or "round and splendid gardens," lies about 8 m. N. W. of the city, and is estimated to contain 12 sq. m. The country becomes hilly in this direction, and advantage has been taken of the natural surface in the arrangement of the different parts of the ground, so that the whole presents every variety of hill and dale, woodlands and lawns, interspersed with canals, pools, rivulets, and lakes, the banks of which have been thrown up or diversified in imitation of nature. Some parts are cultivated, groves and tangled thickets occur here and there, and places are purposely left wild in order to contrast the better with the highly cultivated precincts of a palace, or to form a rural pathway to a retired summer house. The number of residences for the emperor or his ministers within this park is estimated at 30, each of which is surrounded by many houses occupied by eunuchs and servants. The summer palace and principal hall of audience, the most extensive and by far the most splendid of these residences, was plundered by the French and English forces in their advance upon Peking, in October, 1860. The entrance or reception hall was 110 ft. long, 42 ft. wide, and 20 ft. high. It was paved with marble, painted with gold, azure, and scarlet, in the most gorgeous style, and was elaborately furnished. Among the plunder were silks, china, jewels, and valuable presents to the emperors. The English treaty of Tientsin was also discovered, and an immense quantity of spoils of all kinds made it difficult to decide what to take away. In the treasury there was about $61,000 in gold and silver. The total value of the property carried off and destroyed amounted to several millions. Some valuable books and papers were secured for the British museum. In revenge for the cruelty with which some French and English prisoners had been massacred, this palace was burned to the ground.—Though Peking (originally Yehking) is regarded by the Chinese as one of their most ancient cities, it was not made the capital of the country until the conquest by the Mongols, when Kublai Khan (1279–'94) established his court here, then called Shuntien Foo. He afterward removed it to Hangchow. The native emperors of the Ming dynasty, who succeeded the Mongols in 1368, held their court at Nanking, until the third of them transferred the seat of government to Peking about 1410, where it has ever since remained. Under the Mongols the city was called Khan-palik, or city of the khan, and on the Chinese maps it is usually called King-sze, or capital of the court. It was at first surrounded by a single wall pierced by nine gates, whence it is sometimes called the city of nine gates. The N. portion was taken possession of by the Mantchoos in 1644 for barracks and residences. The government purchased the buildings from the Chinese and gave them to their officers; but necessity soon obliged these men, less frugal and thrifty than the natives, to sell them and content themselves with humbler abodes; consequently a great part of the Tartar city is now tenanted by Chinese. The Portuguese sent an embassy to Peking in 1517, but the emperor refused to receive it, and the ambassadors were sent to Canton. They were imprisoned there till 1523, when they were put to death. Subsequent Portuguese and Spanish embassies ended less disastrously, but without important results. A Dutch embassy in 1667 reached Peking, and concluded a commercial treaty; but a second, sent in 1794, was treated with contempt. The Russians have sent several embassies to Peking, and from their frontier being in contact with China have compelled the Chinese to treat them as equals. Their first recorded visit was in 1619. In 1689 the boundary line of the two empires was fixed by treaty, and the following year the ratification was exchanged at Peking. Another mission was sent by Peter the Great in 1719. In 1728 another embassy succeeded in establishing intercourse between the two nations; and a mission was established at Peking, consisting of six ecclesiastical and four lay members, to study the Chinese and Mantchoo languages. The intercourse of the English began later than that of most of the other maritime nations of Europe. In 1792 Lord Macartney was despatched with a large suite, and presents for the emperor. A second embassy was sent in 1816, but was summarily dismissed without an audience, because the ambassador would not perform the humiliating prostrations designated *kotow*, or appear before his majesty the day he arrived. The intercourse of foreigners was for many years after this in a very unsatisfactory condition. On June 14, 1858, Count Putiatin, the Russian ambassador, signed a treaty in which the chief points conceded by the Chinese were the right of correspondence upon an equal footing between the Russian minister of foreign affairs and the first minister of state at Peking; permission to send diplomatic agents to that city upon special occasions; liberty of circulation throughout the empire for missionaries under a system of passports; and the right to trade at ports then open, and in addition at Swatow, at a port in Formosa, and at another in Hainan. On the 18th of the same month the American treaty was signed by Mr. Reed, in which the same privileges were accorded to the government of the United States, and a clause was added conferring all privileges that might in future be granted to "the most favored nation." A few days afterward the English and French treaties were signed at Tientsin. In due course the ratified copies of the American and Russian treaties were exchanged at Peking; but a dispute arising between the ambassadors of other powers and the Chinese with regard to the route by which they should proceed to the capital, they were forced to retire. Early in October, 1860, an English and French force of 25,000 men, after destroying the summer palace and devastating several cities, encamped within the earthwork about a mile outside of the N. wall of Peking. The emperor had escaped to an ancient palace beyond the great wall, and had left his brother, Prince Kung, who was authorized to treat as plenipotentiary with the invaders. The prince showed great reluctance in complying with some of the demands made by Lord Elgin and Baron Gros, but finally yielded to the threat of destroying the city. One of the gates was placed in the hands of the French and another in those of the English; and everything was done that appeared likely to humble the minister and mortify the pride of the Chinese emperor. On Oct. 24 the ratifications of the treaty of Tientsin were signed. The substance of the treaty was as follows: 1, the emperor of China expressed regret at the misunderstanding occasioned by the affair at the Taku forts; 2, the right of the queen of Great Britain to keep a resident minister at Peking was acknowledged; 3, £3,100,000 was to be paid by the Chinese government as indemnity; 4, Tientsin was opened to trade; 5, the interdict upon the emigration of Chinese to the British colonies was removed; 6, a portion of the mainland opposite Hong Kong, called Kowloon, was ceded to the British; 7, the immediate operation of the treaty and convention was provided for. The French also received a large indemnity, and Tientsin was to be occupied by the allies till their claims were satisfied. Since March, 1861, Peking has been the residence of all foreign ministers.

PELAGIUS, the founder of the religious system called Pelagianism. Little is known of his life, but he is supposed to have been a British monk whose real name was Morgan. He went to Rome about 409, where he was distinguished by his purity of life and his zeal for the reform of the clergy and laity. With his disciple Cœlestius he went to Carthage in 411. Pelagius soon left Africa for Palestine, but Cœlestius, who endeavored to be admitted among the presbyters of Carthage, was accused of heresy before a synod held in that city in 412 and condemned for the following doctrines: 1, Adam was created mortal, so that he would have died whether he had sinned or not; 2, Adam's sin injured only himself, and not the human race; 3, new-born infants are in the same condition in which Adam was before his fall; 4, the whole human race neither dies in consequence of Adam's death or transgression, nor rises from the dead in consequence of Christ's resurrection; 5, infants obtain eternal life, though they be not baptized; 6, the law is as good a means of salvation as the gospel; 7, there were some men, even before the appearance of Christ, who did not commit sin. These seven propositions (others count only six, leaving out the fifth, or joining it to one of the other propositions) are still regarded as the cardinal points of the Pelagian system, although it is difficult to decide how far Pelagius accorded with all of them. In consequence of the condemnation of Cœlestius, Pelagius himself was soon attacked in Palestine, where Jerome became one of his most zealous opponents. Jerome, conjointly with Orosius, accused Pelagius at a synod held in Jerusalem in 415. The matter was referred to Pope Innocent I., but at another synod of 15 bishops, held in the same year at Diospolis, under Eulogius of Cæsarea, Pelagius was acquitted. The churches of Africa reiterated their rejection of the system in a synod of 69 bishops at Carthage, and in a synod of 61 Numidian bishops at Mileum, both held in 416. The decision of Innocent was satisfactory to the African bishops, and Pelagius addressed to him an explanatory statement, which did not reach Rome until after Innocent's death. His successor, Zosimus, was induced by the confession of faith that Cœlestius, then in Rome, had drawn up, and also by the letters and protestations of Pelagius, to declare the two accused sound in faith and unjustly persecuted. The African bishops, 214 in number, met again in a synod at Carthage, and stood by their former decision; and Augustine, the most powerful opponent of Pelagius, appealed to the emperor Honorius (418), who ordered the suppression of the new heresy. Another council at Carthage, attended by delegates from all the provinces of Africa, specified and solemnly condemned as heretical nine doctrines of Pelagius. Similar declarations were issued by the bishops Theodotus of Antioch and Praylius of Jerusalem. Zosimus now also lost confidence in the new teachers, and published his *Epistola Tractoria*, in which the Pelagian doctrine is condemned. Many bishops of the western churches subscribed to this epistle; but Julian, bishop of Eclanum in Apulia, undertook the defence of the system. He had to sacrifice his office, and to go with Pelagius and Cœlestius to Asia. Little is known of the further history of Pelagius, his two friends, and their doctrines, except that the last were again condemned as heretical by the œcumenical council of Ephesus in 431. The followers of Pelagius never formed a sect properly so called, but Pelagianism long maintained a foothold in the church.—See Wiggers, *Versuch einer pragmatischen Darstellung des Augustinianismus und Pelagianismus* (2 vols., Berlin, 1831-'3; English translation by Prof. Emerson, New York, 1840), and Jacobi, *Die Lehre des Pelagius* (Leipsic, 1842).

PELARGONIUM. See GERANIUM.

PELASGIANS (Gr. Πελασγοί), a people spoken of by the ancient Greeks as the early inhabitants of the Grecian peninsula, the islands and coasts of the Ægean, and portions of Asia Minor and Italy. Our knowledge about them is very vague and contradictory. Several Egyptologists, including Lenormant and Chabas, suppose they find in the Egyptian inscriptions detailed accounts of the Pelasgic race. According to them the Pelasgians were, even earlier than the 15th century B. C., a mighty people in possession of the northern coasts of the Mediterranean. They carried on an extensive commerce both by sea and land, and had a navy large enough to venture on a war with Egypt. They formed a confederation with the Libyans, Tyrrhenians, and Achæans during the reign of Rameses II., which nearly conquered Lower Egypt, and at one time advanced beyond Memphis. (See LIBYANS.) Ancient Greek writers speak of the Pelasgians as tribes not formed into a nation, without a navy, not warlike, but migratory and agricultural. Homer regards them as the aborigines of Greece, whose original seat was in the neighborhood of Dodona, and who spread themselves over Thessaly, Bœotia, Attica, and a portion of the Peloponnesus, especially Argos and Arcadia. He connects them also with Asia Minor and Crete. Æschylus makes Pelasgus, the king from whom the race derived its name, a ruler over the whole of Greece; while Herodotus says that Greece was called Pelasgia, and includes under the common name of Pelasgians the Athenians, the Arcadians, the Ionians of Asia Minor, the Lemnians, the Samothracians, and the Crestonians. On the other hand, Thucydides says the Pelasgians were only the most numerous of the many kindred races which inhabited Greece. They came from the east, passing over from Asia Minor, where they had built the two cities which bore the name of Magnesia, to the islands and the mainland of Greece, and establishing themselves principally in Thessaly, Epirus, and the Peloponnesus. In Italy the southern tribes, such as the Peucetians, Œnotrians, and Japygians, were of Pelasgic race; and at one time the population of Etruria was also Pelasgian to a very great extent. Judging alone from these vague allusions to them by the ancient Greeks, it would seem that at the beginning of the history of Greece the Pelasgians of Asia were declining, holding only a few scattered posts, "the last strongholds," says Rawlinson, "of a people forced everywhere to yield to conquerors. The natural explanation of the historical phenomena is that the Pelasgi were the original population of western Asia, and that their emigrations across the sea into Europe were occasioned by the pressure upon them of immigrants from the east, Lydians, Phrygians, and Carians, who forced them westward, and so caused their occupation of Greece and Italy." They were skilled in fortification, and in every land which they once inhabited their presence can still be traced by numerous works of defence, built of immense polygonal blocks of stone fitted together without mortar or cement, which have outlasted the structures of succeeding ages and races. These works are commonly called Cyclopean, from their grandeur and antiquity. No historic mention of the Pelasgians occurs in the later writers. Hence it is impossible to determine who they really were, and whatever is advanced in regard to them is mere conjecture. In speaking of the origin and relationship of the Greek language, mention has been made of some of the numerous hypotheses recently brought forward. (See GREECE, LANGUAGE AND LITERATURE OF.) It is also unknown to what language the name Pelasgian belongs, some declaring it Greek, others Semitic, and others Thraco-Illyric. Some connect it with Πέλοψ or Πελαγών, names of equally uncertain origin; others with Pelishti or Pelashi (Philistine), meaning emigrant, and referring to a supposed expulsion from Egypt; and others adopt the popular tradition of modern Greeks that Shkipetaric, the language of the Albanians, is the modern representative of the ancient Pelasgian. Egyptologists, on the other hand, are confident that they are correct in deciphering from the hieroglyphs fragmentary notices of the Pelasgian as the most powerful seafaring nation at and before the time of the Phœnicians.

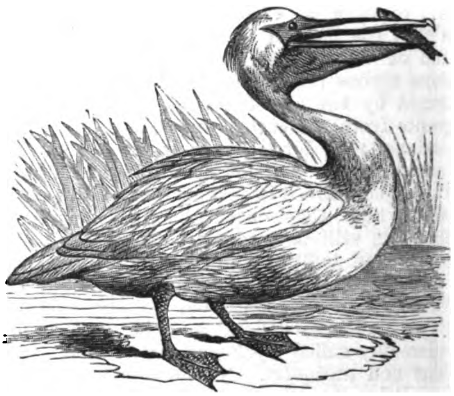
PELAYO, or **Pelagius.** See ASTURIAS.

PELEW ISLANDS, a chain of islands in the N. Pacific ocean, forming part and situated at the W. extremity of the Caroline archipelago, between lat. 6° 50′ and 8° 20′ N., and lon. 134° and 135° E. The group consists of about 26 principal islands, nearly encircled by a coral reef, and covers an extent of about 110 by 80 m. Babelthuap, the largest, is about 28 m. long and 14 m. broad, and contains a mountain so high that the whole group may be seen from its summit. The area of the entire group is 346 sq. m., that of Babelthuap 275 sq. m. The population was estimated by Dr. Gulick at 3,000, while according to Dr. Semper, who during the year 1862 lived on these islands, it is fully 10,000. Seen from the sea, some of the islands appear rugged and mountainous; but the soil is rich and well watered. They are well wooded, and produce breadfruit, cocoanuts, bananas, sugar cane, yams, lemons, oranges, and other tropical fruits and vegetables. Horned cattle, pigs, goats, and fowl are numerous; and turtles, fish, and shell fish abound on the coasts. The inhabitants, of the Malay race, show considerable ingenuity in making canoes, some of which can carry 30 men. The men go entirely naked, and the women almost so.—The Pelew islands are said to have been discovered by the Spaniards in 1545, and they were afterward seen several times by ships bound to China by the eastern passage; but they were first brought to the notice of the civilized world by the wreck of the British ship Antelope, Capt. Wilson, in 1783. The natives treated the crew with the greatest kindness. Capt. Wilson took the son of the chief to England, where he was placed at school. But a more extended acquaintance with the white man has made them treacherous. An excellent work on these islands has been written by the German naturalist Semper (*Die Palau Inseln im Stillen Ocean*, Leipsic, 1873).

PELHAM. See NEWCASTLE, OR NEWCASTLE-UNDER-LYME.

PELICAN, a genus of large, web-footed birds (*pelecanus*, Linn.). The bill is very long, nearly straight, and much depressed; the upper mandible has an elevated ridge, becoming flat toward the end, the tip being strong, hooked, and acute; the lower mandible is wider at the base than the upper, and its branches are united only at the tip; the nostrils are scarcely perceptible, in the lateral groove at the base; the wings are moderate, the second quill the longest, and the secondaries nearly as long as the primaries; the tail is broad, short, and rounded; the tarsi short and stout, covered with reticulated scales; all four of the toes on the same plane, the hind one turned more or less inward, and all connected by broad webs, the middle toe the longest. The head is moderate and crested, the neck long and slender, and the feet toward the middle of the body; under the lower jaw, and extending to the throat, is a loose, naked membranous pouch capable of great distention, which is used as a scoop net for fish; around the eyes and base of the bill are bare spaces. The skeleton is remarkable for the great extent of its air cavities, the bones weighing less than 2 lbs.; from these the air penetrates into the areolar tissue under the skin, making the body for its bulk exceedingly light; the œsophagus is very capacious and the stomach small. The species are not numerous, but are found in most parts of the world, and most abundantly in tropical regions, frequenting both the seacoast and interior lakes and rivers; they are very voracious, feeding entirely on fishes, and the pouch is capacious enough to hold fish sufficient for the dinner of half a dozen men; they are good swimmers, divers, and fliers, and can perch easily on trees. In the morning and evening they leave their roosting places in flocks of about a dozen, and fly to their fishing grounds; they fish until satisfied, swallowing their prey on the spot, and retiring with a full crop to some solitary place to digest it. Their flight is at times elevated, and at others they skim near the surface, balance themselves when they see a fish, and fall headlong upon it with the apparent risk of breaking their necks.—The white pelican (*P. onocrotalus*, Linn.), the *onocrotalus* of Pliny but not of the Greeks, is between 5 and 6 ft. long, and 12 to 13 ft. in expanse of wings; the general color is white, with rosy tinges, and the primaries are black; the upper mandible is bluish with red and yellow tints, and the hook on the end is bright red; the pouch is yellow. It is found in S. E. Europe, Asia, and Africa, sometimes coming as far W. as Germany, but not to Great Britain. The nest is generally made in a rude manner on inaccessible rocks, near fresh or salt water, and the eggs are two to four; it builds sometimes on trees remote from water; the young are fed by the regurgitated food of the parents; this operation is rendered easier by pressing the pouch and lower mandible against the breast, and the contrast of the red hook of the bill against the white of the breast probably gave rise to the poetic idea of the ancients that the female pelican nourished her young with her blood. It is very long-lived; in captivity it will eat rats and small mammals as well as fish; its flesh was forbidden to the Jews, and few would care to eat it, as it is very rank, fishy, and oily; it is said to have been tamed and employed in fishing, like the cormorant among the Chinese. Its pouch has been used to make caps and bonnets and tobacco bags; the Siamese make of it strings for musical instruments, and the Nile and other boatmen use it with the lower jaw attached for baling water from their canoes; it will hold in the living bird 10 to 12 quarts of water, and hence the pelican is called "river camel" by the Egyptians. A variety or species (*P. crispus*, Bruch.) in S. E. Europe is somewhat larger, of a more grayish white, with curled feathers on the back and sides of the head; these collect in flocks, extend their line in the form of a crescent, and by flapping their wings and plunging into the water drive a shoal of fish into a small and shallow space, speedily obtaining a full supply.—The American white or rough-billed pelican (*P. erythrorhynchus*, Gmel.; genus *cyrtopelecanus*, Reich.) is about 6 ft. long, with an alar extent of between 8 and 9 ft., and a weight of 17 or 18 lbs. It much resembles the *P. onocrotalus*, being of a general white color, tinged with roseous in the breeding season; the primaries are black and the iris white; the head and neck are covered with slender, small, and downy feathers, elongated into a crest on the nape and running down the back of the neck; on the body generally the feathers are narrow and long; the crest is yellow, the eyes very bright, and in spring the legs, feet, bill, and pouch are orange red, fading to yellowish in autumn. The bill is 14 in. long, and the sac besides this length extends 8 in. on the throat, being 7 in. deep at the widest part; the wings are long, narrow, and rounded, and the primaries much curved; the tail consists of 24 feathers; the horny and fibrous ridge on the upper mandible of the males increases with age, and is used as a means of defence in their battles; the females are rather smaller than the males. Abundant during the winter in Florida, it is found in summer in the interior of the fur countries as far as lat. 61° N.; it does not occur on the coast of the middle and northern states, as the course of migration is along the great inland rivers. They do not dive for their prey either from the wing or the surface of the water, but thrust the head under as far as the neck will allow, feed-

White Pelican (Pelecanus onocrotalus).


American White Pelican (Pelecanus trachyrhynchus).

ing mostly in shallow places, as they swim along against wind and current with the wings partially extended and the upper mandible only of the bill appearing above the surface; they are sometimes seen in company with the brown species, next described; occasionally they drive fish to shallows, where they can easily scoop them up with the pouch. They destroy a great number of small fish; the flesh is rank and fishy, and unfit for food. The sac is expanded by the opening of the bill, and *vice versa*. They breed in the fur countries, but not generally in the south like the next species; they are found in the Rocky mountains and in California.—The brown pelican (*P. fuscus*, Linn.; genus *onocrotalus*, Wagler) differs from the last species in habits, size, and colors; it is smaller, being only about 56 in. long, with an extent of wings of 7 ft. and a weight of 7 or 8 lbs. The bill is 13⅛ in. long, grayish white, tinged with dusky and with spots of carmine; there is no ridge on the upper mandible; the orbital space is blue, the crest light chestnut red, and the tail has only 22 feathers. The head and sides of the neck are white; the hair-like feathers of the forehead yellow; the neck behind and in front below dark chestnut brown; back, wings, and tail grayish ash, margined with dusky, the last with shafts white at the base and black at the end; primaries brownish black; below dark brownish ash, with narrow longitudinal white lines on the sides; iris white; legs and feet black. The female is like the male, but the feathers of the head are more rigid; the young are dusky brown. It is found from North Carolina to Texas, and on the coast of California; it is a constant resident in Florida, and is now rare N. of St. Augustine; it goes south far beyond the limits of the United States; it is not seen on fresh water beyond the reach of the tide, like the white pelican. The flight, though apparently heavy, is well sustained, performed by alternate easy flappings and sailings, and in long undulating lines; in calm weather they perform intricate aërial evolutions at a great height. They are always awake during the coming in of the tide, which is the favorable time for fishing; they are never seen far from shore when a storm is threatening, and their appearance at sea is regarded by sailors as a sure sign of pleasant weather. They procure their food on the wing, plunging suddenly from a height of 15 to 25 ft., with the lower mandible wide open and the pouch extended, scooping up the fish and swallowing them at once. They do not carry fish or water to their young in the pouch, as had been generally believed, and according to Audubon this part is always contracted during flight. It is not uncommon to see these birds with a hole through the pouch caused by the spine of a fish, and their throats are occasionally reddened by the blood which has flowed from such a wound. They are fond of following porpoises, picking up their share of the terrified fish on which these cetaceans feed; and in their turn they involuntarily provide for the black-headed gull (*chroicocephalus atricilla*, Linn.), which watches their plunges, and as they emerge alights on their head or bill, seizing any small fry which may protrude beyond the bill or pouch; the pelicans do not seem to notice the thefts or clamor of the gulls, and make no attempts to dislodge or drive them away. They are awkward walkers, but buoyant swimmers; when wounded they will bite severely; they feed on fish generally 2 or 3 in. long, rarely taking one as long as the bill; they are powerful, but very sensitive to cold; the flesh is tough and unfit for food, and the eggs are not much better; the senses of sight and hearing are very acute; they are among the most silent of birds. They always keep in flocks of from 20 to 60, and begin to pair by the middle of April; the nest is made of sticks, lined with leaves and grasses, and placed high on a mangrove tree; many nests are built in the same tree, and the trees are often near together; they breed in company with the egrets, herons, and spoonbills, and on islands frequented also by white ibises and frigate pelicans; if not disturbed they use the same breeding places year after year. The eggs, three in number, 3⅛ by 2⅛ in., are thick-shelled and rough, white, more or less tinged with blood. The young are at first fed by regurgitation of the food of the parents, and so abundantly that the refuse fills the air with the most disgusting odor; they grow fast, and are very fat; they are highly prized as food by the Indians and negroes, and are eagerly eaten by vultures.

Brown Pelican (Pelecanus fuscus).

PELIGNI, an ancient people of central Italy, of Sabine origin, who occupied a very small territory between the Marrucini, the Marsi, Samnium, and the Frentani. They were renowned as warlike, like the Marsi reputed as magicians, and long warred against the Romans, but together with their neighbors concluded a peace with the republic about the end of the 4th century B. C. In 295 they attacked the Samnite army on its retreat from the battle of Sentinum, and killed 1,000 of the fugitives. During the second Punic war they furnished their usual quota to the Roman army, and sent volunteers to Scipio besides. They played a principal part in the social war, one of their chief towns, Corfinium, near the Aternus, being selected by the allies as the future capital of Italy, and therefore surnamed Italica. They were finally subdued in 89 B. C. by C. Pompeius Strabo, the father of Pompey the Great.

PELION, in ancient geography, a mountain range of Thessaly, extending along the coast of Magnesia, and forming the promontories of Sepias and Æantium. On the north it is connected by a low ridge with Mt. Ossa. Pelion has a broad and extended outline, well contrasted with the steeply conical shape of Mt. Ossa. Its eastern side rises precipitously from the sea, and on this rocky shore the fleet of Xerxes was lost. On its summit was a temple of Jupiter Actæus, and near this was fabled to be the cave of the centaur Chiron. It is still distinguished for its magnificent forests. In their war with the gods, the giants are said to have attempted to scale heaven by piling Pelion and Ossa on Olympus, or Ossa and Olympus on Pelion. The name Plessidhi is now applied to the N. W. summit of Pelion, which rises to a height of about 5,300 ft.

PÉLISSIER, Amable Jean Jacques, duke of Malakoff, a marshal of France, born at Maromme, near Rouen, Nov. 6, 1794, died May 22, 1864. He studied at the military schools of La Flèche and St. Cyr, entered the artillery, served in Spain in 1823, became a captain in 1828, served in Greece, and in 1830 took part in the expedition against Algeria. In July, 1843, he was made colonel, and in 1845 entered the territory of the Ouled Riahs, who took refuge in one of the spacious caverns in which their country abounds. To all summonses to surrender they refused to listen, and even prevented the approach of messengers by the discharge of firearms. Finally Pélissier applied burning fagots to the mouth of the cave, and suffocated nearly 600 of the Arabs. This action excited general condemnation, but Marshal Bugeaud declared that his subordinate had acted in accordance with his orders. In 1846 Pélissier became brigadier general, and in 1850 general of division. He remained in Algeria till January, 1855, when he was ordered to the Crimea as second in command, and in May he succeeded Canrobert as chief commander. After the fall of Sebastopol he was created marshal of France and duke of Malakoff, and received by vote of the legislative body a pension of 100,000 francs. He replaced Count Persigny as minister to England in April, 1858; but in 1859, on the outbreak of the Italian war, he was recalled to take command of the army of observation in eastern France. From 1860 till his death he was governor general of Algeria.

PELLETAN, Pierre Clément Eugène, a French author, born at Royan, Charente-Inférieure, Oct. 29, 1813. He studied law in Paris, and was a writer for the *Presse* from 1839 to 1849, subsequently for Lamartine's organ *Le Bien public*, and for the *Siècle* from 1853 to 1855, when he returned to the *Presse*. He was elected to the legislative body in 1863, afterward founded the *Tribune*, a radical weekly journal, and was again elected in 1869. On the proclamation of the republic, Sept. 4, 1870, he became a member of the government for national defence. At the election of Feb. 8 he received a larger majority than any of the other ten successful candidates for the national assembly in the department of Bouches-du-Rhône. His principal works are: *La lampe éteinte*, a novel (2 vols., 1840); *Profession de foi du XIX*^{e} *siècle* (1853; 2d ed., 1854); *Heures de travail* (2 vols., 1854); *La nouvelle Babylone*, a tirade against luxury (1862); and *Adresse au roi Coton* (1863).

PELLETIER, Laurent Joseph, a French painter, born at Éclaron, Haute-Marne, in 1810. He became known in 1846 by his "Valley of Sierck," was appointed professor at Metz, and produced many landscapes, including views of Fontainebleau (1865–'74), "The Forest of Biche" (1869), and other forest views.

PELLEW, Edward. See EXMOUTH.

PELLICO, Silvio, an Italian author, born in Saluzzo, Piedmont, June 24, 1789, died at the villa of Moncaglieri near Turin, Jan. 31, 1854. His father, who owned a silk manufactory at Pinerolo, was a man of literary taste. About 1795 the family removed to Turin, and Silvio studied under a priest until he accompanied his sister, on her marriage, to Lyons. The reading of Ugo Foscolo's poem, *I sepolcri*, which appeared in 1807, made a powerful impression on him, and in 1810 he removed to Milan, taught French, and entering the family of Count Lambertinghi as tutor, became acquainted with many distinguished persons. His first production was the tragedy of *Laodamia*. It was followed by *Francesca da Rimini*, which gave Pellico a high rank as a dramatic poet. Byron translated it into English verse, but did not publish it. Pellico's next work was a translation of Byron's "Manfred." In 1819, with some other literary men, he established a journal called *Il conciliatore*, in which his *Eufemio di Messina* and Manzoni's *Conte di Carmagnola* first appeared. On account of its liberal tendencies it was early subjected to a rigid censorship by the Austrian authorities, and in 1820 it was entirely suppressed. About this time Pellico appears to have become a member of the revolutionary society of the carbonari. On Oct. 13, 1820, he was arrested. He was first confined in the prison of Santa Margherita at Milan, and thence was removed to the leads of Venice, and subsequently to a state prison on the island of San Michele near the latter city. In February, 1822, he was condemned to death, but by an imperial rescript the sentence was commuted to 15 years of severe imprisonment (*carcere duro*). In April, 1822, he was taken to the prison of the Spielberg near Brünn in Moravia, where, through the kindness of his jailer, he was treated with comparative indulgence for about 18 months. But the jailer was removed, and his treatment during the remaining years of his imprisonment was exceedingly rigorous. When nearly at the point of death, he was freed by an imperial order on Aug. 1, 1830. He was taken to the Piedmontese frontier, and spent the rest of his life at Turin. In 1831 he published an account of his ten years' suffering in a work entitled *Le mie prigioni* ("My Prisons"), which at once became widely celebrated, and was translated into many languages. His "Works" were published in Padua in 2 vols. (1831); and at Turin, under the title of *Tre nuove tragedie*, appeared in 1832 a volume containing his *Gismonda da Mendrisio*, *Leoniero da Dertona*, and *Erodiade*. In 1833 he published the tragedy of *Tommaso Moro*. In 1837 a collection of his "Inedited Works" appeared in 2 vols. One of his last productions was a religious treatise in prose entitled *Dei doveri degli uomini* ("The Duties of Man"). His life was written by Chiala (Turin, 1852), and also by Bourdon (Paris, 1868).

PELOPIDAS, a Theban general, killed at the battle of Cynoscephalæ, in Thessaly, in 364 (according to Grote probably in 363) B. C. He inherited great possessions from his father Hippoclus, of which he made a liberal use. In a battle his life was saved by Epaminondas at great risk; and from this began a friendship which lasted until the death of Pelopidas. His wealth and his devotion to public affairs made Pelopidas a prominent member of the popular party, so that, upon the seizure of the Cadmea by the Spartan general Phœbidas in 382, he with 300 others took refuge at Athens. There he remained three years, and finally projected the enterprise which restored democracy to Thebes. With six others he entered that city at nightfall, put to death the philo-Laconian polemarchs, slew Leontiades, the leader of the Spartan party, with his own hand, and gained possession of the citadel by the garrison's capitulating. From that time until his death he was every year elected one of the Bœotarchs, and in 378–'6 he bore a conspicuous part in the war against the Lacedæmonians. In 375, while returning from an attempt to surprise Orchomenus, he fell in at Tegyra with a Spartan force superior to his in number, but in the battle which followed was completely victorious. At Leuctra in 371 he commanded the sacred band, defeated the enemy's right wing, and decided the day. Afterward he seconded Epaminondas in persuading their colleagues in the army to march into the Spartan territory, although by so doing they would exceed their terms of office, an offence which according to law was punishable with death; yet on their return they were acquitted. In 368 Pelopidas was sent to succor the inhabitants of Thessaly, oppressed by Alexander of Pheræ; he occupied Larissa, and compelled the tyrant to acknowledge his authority. Advancing into Macedonia, he composed the differences between Alexander II. and Ptolemy of Alorus, and took as hostages 30 boys, among whom was Philip of Macedon. In 367 he went as envoy to the Persian court at Susa, where he obtained a rescript that Messene and Amphipolis should be autonomous cities, that Athens should order home all the ships in active service, and that Thebes should be deemed the head city of Greece. Shortly after his return Pelopidas was treacherously seized as a prisoner by Alexander of Pheræ, while on a mission to him. Plutarch places the seizure before the time of the embassy to Persia, and Diodorus puts it at 368–'7, but several reasons are adduced by Grote for supposing it to have occurred after that embassy. A Theban force under Epaminondas released Pelopidas. Despatched in 364 (or 363) to Thessaly at the head of an army, although the portents were unfavorable, and his troops were terrified by an eclipse of the sun, he pressed on. At Pharsalus he encountered Alexander at the head of a superior force, and a contest for the hills called Cynoscephalæ immediately ensued. After a severe struggle, the tyrant was defeated; but Pelopidas, seeing Alexander himself, rushed to the spot where he was standing, attended by a few soldiers only, and was slain.

PELOPONNESUS (Gr. "the island of Pelops," so called by the Greeks because King Pelops was supposed to have settled a colony there), a peninsula forming the southern division of Greece; area, 8,288 sq. m.; pop. in 1870, 645,-889. It lies between lat. 36° 23′ and 38° 20′ N., and lon. 21° 5′ and 23° 33′ E., and is about 140 m. in length and nearly the same in extreme breadth. The ancient Greeks compared its shape to that of the leaf of a vine or a plane tree, and the Italians gave it its modern name Morea from *moro*, a mulberry tree. The coast is much indented, on the south by the gulfs of Kolokythia and Kalamata (the Laconian and Messenian gulfs of the ancients), and on the east by the gulf of Nauplia or Argolis. It is connected with central Greece by the isthmus of Corinth, which is 5 m. wide at the narrowest part, and separates the gulf of Lepanto (or the Corinthian) from that of Ægina (the Saronic). The surface of the peninsula is generally mountainous. In the centre a long and lofty ridge bent into a circular form encloses an elevated basin, the famous vale of Arcadia, the largest of the ancient states. Five other ranges, running from the different sides of the central one to the five prominent points on the coast of the peninsula, enclose plains or valleys which were formerly the seats of five states: Achaia in the north, Argolis in the east, Laconia and Messenia in the south, and Elis in the west. The mean height of the mountains is about 1,200 ft., but on the W. side they attain a height of from 3,000 to 4,500 ft. Mt. Cyllene, on the N. side of Arcadia, is 7,788 ft. high; and Mt. Taygetus, the ridge which stretches southward from Arcadia to Cape Matapan (anc. *Tænarum*), is at the highest point 7,904 ft. above the sea. The principal rivers are the Alpheus, which rises in Arcadia and flows W. through Elis into the Ionian sea; and the Eurotas, which rises in N. Laconia and flows southward into the Laconian gulf. The climate is mild and the soil fruitful. The chief productions are corn, wine, oil, and fruits, honey, figs, silk, cotton, and the small raisins called currants, which are the principal article of export. At present the peninsula is divided into five nomarchies or provinces, viz.: Argolis and Corinth, the capital of which is Nauplia; Achaia and Elis, capital Patras; Arcadia, capital Tripolitza; Messenia, capital Kalamata; and Laconia, capital Sparta. Its ancient population has been computed at 2,000,000, which is probably an exaggeration, though it was certainly much more populous and flourishing than at present. It contains many ruins of famous ancient cities, among which those of Sparta, Mycenæ, and Mantinea are the most interesting.—About 80 years after the fall of Troy, according to Greek traditions, the Peloponnesus was conquered by the Dorians, led by the descendants of Hercules, who claimed possession of the country by ancestral right. This event is known in history as the return of the Heraclidæ. The Dorians established several states, one of which, Sparta or Laconia, became under the institutions of Lycurgus the most powerful in Greece. A combination of the Peloponnesian states against Athens in the latter part of the 5th century B. C. gave rise to the great contest known as the Peloponnesian war. In the decline of Greece, in the 3d century B. C. a temporary importance was given to the Peloponnesus by the Achæan league, to which a political organization was given by Aratus in 251, and which played a dominant part in the affairs of Greece till the conquest of the country by the Romans in 146. On the division of the Roman empire the Peloponnesus became subject to the emperor of Constantinople; and after the capture of that capital by the crusaders in 1204 it became the spoil of various princes and the seat of petty principalities. The Turks conquered it in the latter part of the 15th century, and subsequently waged wars for its possession against the Venetians, who obtained it by the peace of Carlovitz in 1699, but lost it in 1715. During the Greek war of independence, which began in 1821, it was the theatre of many interesting events. (See GREECE, and the articles on the ancient and modern divisions of the peninsula.)

PELOPS, in Grecian mythology, the son of Tantalus and grandson of Zeus. His father, having invited the gods to a banquet, killed Pelops, and served up his remains at table. Ceres ate a piece of the shoulder; but the other immortals, perceiving what the dish was, ordered Mercury to restore the youth to life by putting the flesh in a caldron. Pelops was accordingly taken out alive, and in place of the part which Ceres had eaten received a shoulder of ivory, whence all his descendants, the Pelopidæ, were supposed to have one shoulder remarkably white. Afterward he applied to Œnomaus, king of Pisa in Elis, for the hand of his daughter Hippodamia; but the king, having been told by an oracle that his son-in-law would kill him, refused unless Pelops should conquer him in a chariot race, declaring that he would take his life if he failed. Pelops bribed the king's charioteer Myrtilus to remove the linchpins of the royal chariot, and in the race Œnomaus was thrown out and killed. The victor then took Hippodamia to wife, assumed the government of Pisa, and soon made himself master of Olympia, where he restored the Olympic games with great splendor. By Hippodamia he had 15 children, the two eldest of whom were Atreus and Thyestes. He was held in great veneration after his death, and a sanctuary was dedicated to him in the grove Altis at Olympia.

PELOUZE, Théophile Jules, a French chemist, born at Valognes, La Manche, Feb. 26, 1807, died at Bellevue, near Paris, June 1, 1867. He completed his studies under Gay-Lussac, and in 1830 became professor of chemistry at Lille, but soon returned to Paris as lecturer on chemistry and adjunct of Gay-Lussac at the polytechnic school. He coöperated with Liebig about 1836 in the discovery of œnanthic ether and in other chemical researches. In June, 1837, he succeeded Dumas as titular professor at the polytechnic school, and from 1839 to 1851 filled the chair previously occupied by Thénard at the collége de France. He was also assayer of the mint, and in 1848 became president of the coinage commission. He established a private laboratory in 1846, which was attended by many pupils. In conjunction with E. Frémy he published *Traité de chimie générale, analytique, industrielle et agricole* (3d revised ed., 7 vols., 1862-'5), and *Abrégé de chimie* (4th ed., 3 vols., 1865-'6); and among his numerous other works is *Mémoire sur la poudre-coton* (*pyroxyle*) (1864).

PELVIS (Lat., a basin), in anatomy, the lowest of the three great divisions of the trunk, the upper being the thorax and the middle division the abdomen. The term pelvis is generally used to designate the bony framework which supports the lumbar vertebræ and rests upon the thigh bones, while the space included is called the cavity of the pelvis. It is composed of four bones, viz.: two ossa innominata, *a a*, and, included between them posteriorly, the sacrum, *s s*, and coccyx, *x*. Each os innominatum is divided into three parts, the ilium, the ischium, and the pubis. The ilium is the wing or more expanded division marked *a a* in figs. 1 and 2; the ischium is the lower division, between *g* and *r*, the lower part of which, marked *t*, is called its tuberosity, and is the point upon which the body rests in sitting. The pubis is the anterior division *h k*. These divisions meet in the socket (*acetabulum*) of the thigh bone, the dotted line showing the three divisions, which are developed from three primary (eight individual) centres, and which do not become perfectly consolidated till the age of puberty. The sacrum is the wedge-shaped bone *s s* in the posterior part of the pelvis, between the articular surfaces of the ossa innominata. Its base is directed upward, having in its middle an oval articular surface corresponding to the articular surfaces of the vertebræ. Behind this is the central canal, which forms the lower portion of the spinal canal. The pelvis is divided by a prominent line *i i*, fig. 1, called the *linea ileo-pectinea*, into the false and the true pelvis. The false pelvis is that portion above the line, embraced by most of the ilium, and the upper portion of the ischium. In front the false pelvis is incomplete, and behind there is also a small interval in the middle of the sacrum. The false pelvis is bounded laterally by the crest of the ilium *c c*, which is a favorable point of attachment for muscles, and its broad wings help to sustain the contents of the abdomen. The true pelvis is all that portion below the linea ileo-pectinea, being mainly embraced by the ischia and pubes. It has a superior circumference, brim, or inlet, and an inferior circumference, or outlet. The brim is formed laterally by the linea ileo-pectinea, anteriorly by the upper margin of the pubes, and posteriorly by the anterior margin of the base of the sacrum, and the sacro-vertebral angle. (See Skeleton.) The inlet of the pelvis is somewhat heart-shaped, with its obtuse apex in front. It has three principal diameters, an antero-posterior (sacro-pubic), a transverse, and an oblique. The antero-posterior diameter extends from the sacro-vertebral angle to the symphysis pubis. The transverse diameter extends from the middle of the brim on one side to the same point on the other.. The oblique diameter extends from the sacro-iliac symphysis or union on one side to the prominence at the junction of the ileum and the pubes (ileo-pectineal eminence) on the other. The outlet of the pelvis is irregular, and is bounded by three prominent eminences, viz.: the point of the coccyx, *x*, posteriorly, and the tuberosities of the ischia laterally. These eminences are separated by three notches: one in front between the pubes and the ascending portions (*ramus*) of the ischia, and called the pubic arch; and one on either side of the sacrum and coccyx, called the sacro-sciatic notches. In the natural state the two latter are converted into foramina by the lesser and greater sacro-sciatic ligaments, *m n*, fig. 3. These ligaments practically lessen the irregularity of the outlet. The two large openings contained between the rami of the pubes and ischia, and situated below and a little in front of the socket for the head of the thigh bone, are called the *obturator foraminæ*, and in the natural state are closed by a ligament called obturator ligament, which gives attachment to muscles of the same name. The diameters of the outlet are two: an antero-posterior, which extends from the tip of the coccyx to the lower part of the symphysis pubis; and a transverse, extending from the posterior part of one ischiatic tuberosity to the same point on the opposite side. The cavity of the true pelvis is contained between the inlet and the outlet, and has an average depth posteriorly (*o x*, figs. 1 and 2) of 4·5 in., being the length of the sacrum and coccyx. Its depth at the middle is 3·5 in., and anteriorly, at the symphysis pubis, it is 1·5 in. The diameters of both the brim and the outlet differ in the two sexes, as do the characteristics of the whole

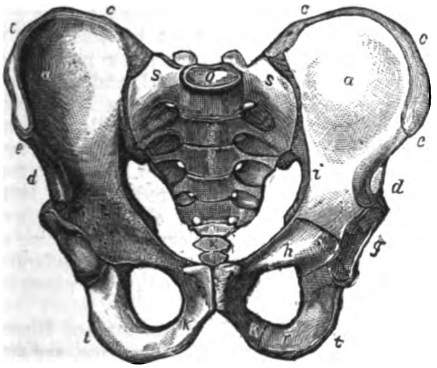


Fig. 1.—Male Pelvis, European.

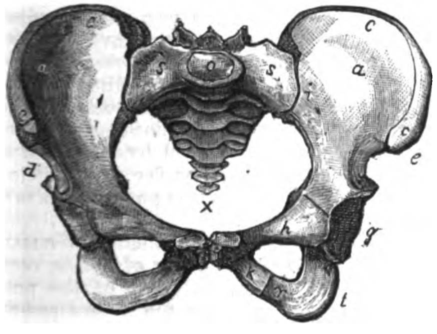


Fig. 2.—Female Pelvis, European.

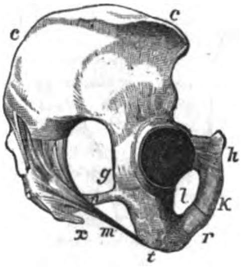


Fig. 3.—Side View of Right Os Innominatum.

pelvis. The average measurement of the diameters in an adult female pelvis (fig. 2) are as follows: brim—antero-posterior, 4·4 in.; transverse, 5·4 in.; oblique, 4·8 in.; outlet—antero-posterior, 5 in.; transverse, 4·3 in. The soft parts, composed of various tissues, practically reduce these diameters from about one half to one inch or a little more. In the male pelvis (fig. 1) the bones are thicker and stronger, the eminences and impressions on their surfaces for the attachment of muscles are more strongly marked, the cavity is deeper and narrower, and the obturator foraminæ larger. The female bones are lighter, more expanded, and less massive, the sacrum is wider and less curved, the promontory less projecting, and the coccyx more movable; the arch of the pubes is also wider and the edges are more turned outward; the tuberosities of the ischia and the acetabula are wider apart, and the ilia are wider and more expanded. For several years after birth the human pelvis is small in proportion to that of the adult; at the commencement of puberty the pelves of the two sexes are much alike, but at that period they begin to develop more rapidly and to acquire their distinguishing characteristics. The pelvis differs somewhat in the different races of the human family, and much more in the lower mammalia. In the negro it is longer and narrower, the difference being greater in the male than in the female. In the apes and monkeys the difference greatly increases, as shown in fig. 4, which represents the pelvis of a large monkey where the transverse diameter was 2·7 in., and the antero-posterior 3 in. As the dimensions of the pelvis are closely related to the act of parturition, the reduction in the diameters and the increased length and straightness of the cavity in the negro are compensated by the smaller size of the cranium of the offspring. The cavity of the pelvis in ordinary conditions of the individual contains the urinary bladder and internal organs of generation, and also the lower portion of the intestinal canal. There is no membranous division between the cavities of the abdomen and pelvis, as there is between the abdomen and the thorax (see DIAPHRAGM), and sometimes the pelvic cavity is spoken of as a part of the general abdominal cavity.

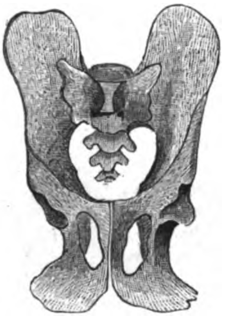


FIG. 4.—Pelvis of Monkey.

PEMBERTON, John C., an American soldier, born in Philadelphia in 1817. He graduated at West Point in 1837, became first lieutenant of artillery in 1842, was aide-de-camp to Gen. Worth during the Mexican war, was brevetted captain for gallantry at Monterey in 1846, and major for gallantry at Molino del Rey in 1847, and distinguished himself also at Contreras and Churubusco, and at the capture of the city of Mexico, in which he was wounded. He became captain Sept. 16, 1850, and resigned April 29, 1861. He entered the confederate service as a colonel of cavalry, and was appointed assistant adjutant general to Gen. Joseph E. Johnston. In 1862 he was made a brigadier general, and in the latter part of the same year a lieutenant general, and appointed to command the army in northern Mississippi. He was defeated at Champion hills, May 16, 1863, and at Big Black river the next day, and shut up in Vicksburg by Gen. Grant. After a regular siege he surrendered, July 4, 1863. (See VICKSBURG.) At the close of the war he was inspector of artillery, commanding at Charleston. Since then he has been a farmer near Warrenton, Fauquier co., Va., where he now (1875) resides.

PEMBINA. I. The N. W. county of Minnesota, bounded N. by British America, and separated on the west from Dakota by Red river; area, about 7,000 sq. m.; pop. in 1870, 64. On the northeast it borders on the Lake of the Woods. It is watered by tributaries of the Red and Rainy Lake rivers. The valley of Red river contains much good farming land. II. The N. E. county of Dakota, bordering on British America and Minnesota, being separated from the latter by Red river, and watered by Pembina and Park rivers, affluents of the Red; area, about 2,500 sq. m.; pop. in 1870, 1,213. The bottom lands of Red river are very productive and well adapted to wheat. Capital, Pembina.

PEMBROKE, a borough and seaport of Pembrokeshire, Wales, on a creek of Milford Haven, 206 m. W. by N. of London; pop. in 1871, 13,704. At the W. extremity of the rocky ridge on which the town stands are the ruins of a fortress erected in 1092, in which Henry VII. was born; it is among the most remarkable monuments of antiquity in S. Wales. The trade of the place, which was once considerable, has been transferred to Haverfordwest, and it now owes its chief importance to the royal dockyard, removed from Milford Haven in 1814 to Pater, or Pembroke Dock, 2 m. N. W. of the old town. The dockyard, comprising 60 acres, is surrounded by a high stone wall, and includes 12 slips for ship building. More than two thirds of the population live in this part of the town.

PEMBROKE, Earl of. See HERBERT, WILLIAM.

PEMBROKESHIRE, a county of Wales, occupying the extreme S. W. point of the principality, and bordering on the Bristol and St. George's channels; area, 628 sq. m.; pop. in 1871, 91,998. The coast line is indented by numerous bays and studded with islands. The rivers are small. The surface is generally undulating, with low hills and rich meadows and corn fields. The anthracite coal tract bisects the county. Copper ore is found, slate and coal are worked, and the fisheries are valuable.

The principal towns are Pembroke, Haverfordwest (the capital), St. Davids, Milford, and Tenby. Milford Haven is the chief port.

PEMISCOT, a S. E. county of Missouri, in the extreme corner of the state, bordering S. on Arkansas and bounded E. by the Mississippi river, which separates it from Tennessee; area, 300 sq. m.; pop. in 1870, 2,059, of whom 148 were colored. Its surface is nearly level, much of it being covered by swamps, the largest of which, Lake Pemiscot, has an area of about 75 sq. m. The chief productions in 1870 were 210,145 bushels of Indian corn and 136 bales of cotton. There were 791 horses, 1,167 milch cows, 2,446 other cattle, 635 sheep, and 9,377 swine. Capital, Gayoso.

PEMMICAN, a preparation of preserved meat, made by cutting lean meat into thin strips, and, after they are thoroughly dried, reducing the substance to powder and mixing it with melted fat. It is largely used by the northern *voyageurs*, and constitutes an important item in the supplies furnished by the Hudson Bay company to their employees.

PEN, an instrument for writing with a fluid. Pens of some sort have been in use from very ancient times, adapted to the material upon which the written characters were to be impressed. Upon stone or metallic plates gravers of steel served for writing, and such are referred to by Job in speaking of an "iron pen." For the waxen tablets of the ancients a metallic stylus was employed, one end of which was sharpened for marking, and the other was flattened for erasing the marks and smoothing the wax. It was also the practice in ancient times, as among the Chinese at the present day, to paint the letters with a fine hair pencil. Pens of reed also were made at a very early period for the use of a fluid ink upon papyrus. The reed selected for this purpose is described as small and hard, and about the size of a swan's quill. It was found in Egypt and Armenia and along the shores of the Persian gulf. The introduction of paper rendered finer pens necessary, and quills of the goose and swan next came into use, and for extremely fine writing those of other birds, as of the crow, were found well adapted. A great trade grew up in these articles, and continued for several centuries. Poland and Russia were largely engaged in it, and immense flocks of geese were raised in those countries chiefly for their quills. In a single year St. Petersburg furnished to England over 27,000,000 quills. Germany and the Netherlands have also been large producers of goose quills. To prepare them for use, they are sorted according to quality, dried in hot sand, cleaned of the outer skin, and hardened by dipping them into a boiling solution of alum or of diluted nitric acid. Quills are still preferred by many to all other pens.—In 1803 Mr. Wise of Great Britain produced pens of steel of barrel form, mounted in a bone case for carrying in the pocket. These were expensive and little used. The late Mr. Gillott of Birmingham began the manufacture about 1820, and introduced great improvements in the steel pen, making it of thinner and more elastic steel, and of higher finish and temper. Mr. Perry also was among the first large manufacturers; and the improvements which followed reduced the cost so much that a gross of the pens, now made without the barrel, could be purchased for about the price of one of those made by Mr. Wise. Other makers succeeded, and a great variety of forms of pen were devised to give the required elasticity and the capacity of holding a proper supply of ink. The trade centred in Birmingham, which supplies many countries in Europe, as also the principal demand for steel pens in the United States. Many unsuccessful attempts were made in the United States to compete with the English manufacturers, but within a few years large quantities have been made in this country of a good quality. The process of making steel pens, as carried on by Mr. Gillott, is briefly as follows. Fine sheet steel, made at Sheffield, about 8 ft. long by 3 ft. broad, generally prepared from Swedish bloom, is cleaned of scale by sulphuric acid and washed. After being passed through rollers to reduce it to the exact thickness required, the steel is slit into strips wide enough to allow of the cutting of three or four pens. These are passed through a cutting machine, which by means of dies punches out the pens, or, as they are now called, the blanks. The blanks are passed through a succession of operations, each performed separately, generally by women or girls. The side slits (*a*, fig. 1) are first cut by punches worked by small hand levers. Then the hole between these is punched (*b*, fig. 1). The preceding processes have now made the steel brittle; the blanks are therefore annealed by putting a quantity of them into an iron box, which is heated. They are

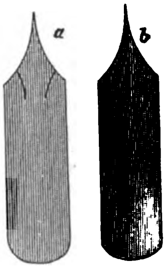


Fig. 1.

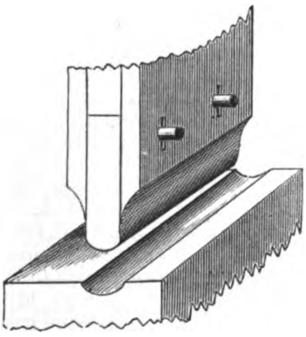


Fig. 2.

then stamped in a die with the name of the maker and any other desired mark, and next receive their final shape by being placed in a grooved die shown in fig. 2. They are next tempered in oil and polished with emery powder by revolving in a large cylinder, after which the nibs are ground. Then follows the most important operation, that of making the central slit, upon the nicety of which the value of the pen greatly depends. This is done in a hand press, similar to those previously used, but the cutting is effected by two chisels, one fixed on the table, the other in the lever, and so accurately adjusted as just to clear each other. Being further tempered in a revolving cylinder over a charcoal stove, and given a brown or blue color, they are glazed with lac dissolved in naphtha, when they are selected and counted.—The manufacture of pens of elastic material furnished with durable points of some extremely hard substance began in England with attempts to secure bits of metal to pens made of glass, tortoise shell, and horn. This finally led to the production of gold pens, the manufacture of which is carried to the highest perfection in New York, the best pens being made here and sent to Europe and other parts of the world. In 1823 John Isaac Hawkins, an American residing in England, imbedded pieces of diamond and ruby in the points of tortoise-shell pens, which were softened in water to receive the stones. The same manufacturer, hearing that bits of an extremely hard native alloy of iridium and osmium, sent by Dr. Wollaston to a penmaker to be used for points, had been returned as too hard for working, obtained these for his own experiments, and was the first to produce the famous "diamond points" soldered to gold pens. The right to make gold pens was purchased of Mr. Hawkins by Mr. Cleveland, an American clergyman then in England, who on his return induced Levi Brown, a watchmaker in Detroit, to undertake their manufacture. This was about the year 1835. The experiment was attended with little success. Mr. Brown removed in 1840 to New York, and there introduced the business, which gradually increased in importance as the quality of the pens was improved, and the price diminished by their more rapid production. At first the pens were cut with scissors from a thin flat strip of gold, and a slit being cut in the nib a bit of iridium was soldered to each point separately, and the points were then rounded up into shape with a mallet upon a stick. The inferior pens thus made by hand sold for $5 to $10 each. The first machines, and almost the only important ones in use applicable to the different branches of this work, were invented by Mr. John Rendell, who was employed by Mr. Brown. He continued to make these machines of various forms and of extraordinary perfection from the year 1844, and furnished them to Mr. Bagley and Mr. Barney, who were well known as among the early makers of gold pens. To these inventions is chiefly due the excellence of the gold pens made in this country. Mr. Rendell systematized the process, giving to each workman his peculiar branch, and thus nicety and certainty of good work were attained. Great improvements have been introduced, and the cost of production materially lessened, the general process being similar to that for steel pens. The finishing consists in fixing iridium points, which is done by laying them in a notch at the end of the slit and fusing them on with a flux. A copper emery wheel grinds the points to the desired shape and thickness, when they may be further brightened by dilute nitric acid and a polishing wheel.—Pens have also been made of hardened gutta percha, and of caoutchouc similarly treated; but they have not proved of much service. The so-called "Protean fountain pen" contains a supply of ink in its hollow handle, and the tube which holds it extends nearly to the point, the pressure upon which in writing causes the ink to ooze down to it just as it is required. These pens are furnished with holders suitable for carrying in the pocket, and thus are always at hand for use with their own supply of ink.

PEÑAFORT, or **Peñaforte.** See PENNAFORT.

PENANCE (Lat. *pœnitentia*, penitence), a penalty accepted or self-imposed by way of satisfaction and token of sorrow for sin. Ecclesiastical penances were inflicted under the Jewish dispensation, and we read in the Old Testament of individuals and whole cities or peoples fasting and performing other acts of humiliation. The idea of penance seems to have been familiar even to heathen nations. The revolting austerities practised by the Hindoo devotees, if they can properly be called penances, are among the most striking examples of this class. In the early Christian church penances were of three sorts, secret, public, and solemn. The first consisted of such actions as are commonly imposed by confessors at the present day, as for instance the recitation of certain prayers. Public penance was in use from the earliest days of the church, and accompanied the readmission to communion of persons who had been excluded from it for grievous offences. It was frequently very severe, and the penitents, besides being required to kneel in worship while the rest of the faithful were permitted to stand, had to make a public confession of their sins in the church. Of solemn penance, which seems to have originated about the middle of the 3d century, or soon after the rise of the Novatian heresy, there were four degrees. The first was that of the weepers, who remained at the door of the church clad in sackcloth and ashes, and begged the prayers of the faithful as they passed in. The second was that of the listeners, who were permitted to enter the vestibule to hear the reading of the Scriptures and the sermon, but went away before the mass of the catechumens commenced. The prostrate, who belonged to the third class, knelt in the space between the doors of the church and the *ambo*, or desk where the epistle and gospel were read; they were dismissed at the same time with the catechumens. The fourth degree of penitents were the ***consistentes*** (literally, co-standers), who stood with the faithful before the altar and remained throughout the service, but might neither make oblations with them nor receive the eucharist. During the term of penance expressions of joy were to be laid aside, gay dresses put off, and marriage, feasting, bathing, and various bodily gratifications abstained from. The men were to cut their hair and beards, and the women to appear with dishevelled locks. The penitents were also expected to abound in good works, and be present, as far as it was permitted them, at every religious assembly. The collection of canons which appointed the time and manner of penances for different sins was called the Penitential. The final readmission of penitents to communion was attended with certain forms, and in ordinary cases the officiating minister was a bishop, though the inferior clergy could admit a penitent from a low degree into a higher one. In the eastern church, the ceremonies of solemn penance were retained until about the close of the 4th century, and in the western church until near the end of the 7th. It gradually became customary for the bishops to commute the canonical penances for pious works more agreeable to the spirit of the age, such as pilgrimages, works of charity, and alms deeds, and these in turn were exchanged for indulgences. (See INDULGENCE.)—In the Roman Catholic and eastern churches penance is one of the seven sacraments instituted for the remission of post-baptismal sins. It consists of three essential parts, contrition, confession to an authorized priest, and absolution, to which may be added a disposition on the part of the penitent to make satisfaction to God and man for his offences. A slight penance by way of satisfaction is always enjoined upon the penitent by the confessor; and though a willingness to receive it is a requisite disposition on the part of the former, the neglect to fulfil it does not invalidate the sacrament. (See CONFESSION, AURICULAR.)

PENANG, Pulo Penang ("Areca island"), or **Prince of Wales's Island,** an island belonging to Great Britain, situated at the N. entrance of the strait of Malacca, extending from lat. 5° 14′ to 5° 29′ N., and from lon. 100° 9′ to 100° 25′ E.; area, 107 sq. m.; pop. in 1865, 59,956. George Town is the capital. The channel dividing the island from the mainland is navigable for large vessels, and varies in breadth from 2 to 7 m., the harbor of George Town being the N. part of it. The form of Penang is very irregular, and the coasts are bold and indented by several bays. There are many small streams. The surface is uneven, and intersected by a mountain range, the highest point of which, West hill, is about 2,600 ft. above the sea. The whole of the island and where not cultivated is densely wooded. Tin ore is said to be abundant in the mountains. Rice is grown in great quantities, and tapioca for the American market. Cocoanut planting is largely carried on, and many other tropical fruits and vegetables are grown; and the forests yield valuable teak and other timber. The original inhabitants were a few Malays; but since the British occupied the island, people from Hindostan, Burmah, Siam, China, and all the neighboring islands have settled upon it, nearly one third of the whole being Chinese.—The island of Penang formerly belonged to the king of Queda in Malacca, but was given by him in 1785 as a marriage portion with his daughter, who married Capt. Light, the master of a British ship trading in the straits. The English East India company acquired possession of it by purchase from Light in 1786, and appointed him governor; and afterward, in consideration of an annual income paid to the king, the sovereignty of the island and the opposite coast was ceded to them. (See STRAITS SETTLEMENT.)

PENATES (Lat. *penus*, inmost), the household gods of the Romans, who dwelt in the innermost parts of the house, and were the guardians of the family (either the private family, or the state as the great family of citizens). The private penates had always their place at the hearth. In their honor a perpetual fire was kept burning; every meal was a sacrifice, beginning with a purification and ending with a libation to them; and at the departure or return of any member of the household, the penates were saluted in the same manner as the other dwellers in the house. The lares are probably to be numbered among the penates, although evidently not the only penates, as a family rarely had more than one lar, while the penates are never spoken of in the singular. Varro says the number and names of the latter were indefinite. The public penates of Rome, depicted as two young men holding lances, had a sanctuary near the centre of the city in a place called *sub Velia*. Sacrifices were made to them by generals when departing on their campaigns, and by consuls, prætors, and dictators when entering upon their office.

PENCIL, a name applied to instruments of various forms and material for writing, drawing, and painting. The first form of pencil is supposed to have been made of earth or chalk, and used by the early Greeks and Egyptians in monochromatic pictures. As early as the 4th century B. C. wet colors were used by the Greeks, and applied with a small pointed brush, called a pencil. Such pencils are made of the hairs of the camel, badger, sable, mink, kolinski, polecat, and goat, and the bristles of hogs. The finer hairs, as those of the sable, are exclusively used by artists. The hairs, selected and arranged with their points in the form of an acute cone, are bound with a thread and drawn through a goose quill, or a conical tin or silver tube, to which a wooden handle is fixed. —Lead pencils, so called because made of graphite or black lead, are among the most widely distributed manufactures. The best graphite for drawing pencils is in the Cumberland mines, England. Vast quantities also have been found in Siberia of a very fine quality. But graphite is rarely found so free from impurities as to form pencils homogeneous enough to be relied on by the artist. It is therefore finely pulverized and again formed into solid blocks by the application of great pressure, usually in hydraulic presses. Great difficulty was experienced in consolidating the particles and causing them to adhere without using some cement, by which the quality would be injured. This was at last accomplished by Mr. Brockedon of London, who after subjecting the material to considerable pressure enclosed it in a case of glued paper with an orifice, placed it under the receiver of an air pump, and exhausted the air. Then by a contrivance the orifice in the glued paper was closed, and the block removed and subjected to further pressure, when it became as solid as a natural block from the mine. The pencils are made by sawing the block into square bars, inserting these in grooves of corresponding size cut in pieces of wood, covering them with other pieces of wood, and reducing these by machinery to the desired shape, which is usually that of a cylinder, but it may be hexahedral or octahedral. The maker's name, and letters or numbers indicating the degrees of hardness, fineness, or depth of shade, are then stamped upon them.

PENDLETON. **I.** A N. E. county of West Virginia, bordering on Virginia, enclosed between two ranges of the Alleghanies, and intersected by the S. branch of the Potomac and two of its tributaries; area, about 800 sq. m.; pop. in 1870, 6,455, of whom 94 were colored. Its surface is mountainous and covered with forests, and the soil not very fertile. The chief productions in 1870 were 37,984 bushels of wheat, 10,594 of rye, 59,228 of Indian corn, 14,538 of oats, 56,876 lbs. of butter, 26,273 of wool, and 5,079 tons of hay. There were 1,767 horses, 2,270 milch cows, 5,155 other cattle, 9,943 sheep, and 4,246 swine. Capital, Franklin. **II.** A N. county of Kentucky, bordered N. E. by the Ohio, and intersected by the Licking; area, 300 sq. m.; pop. in 1870, 14,030, of whom 641 were colored. It has an undulating and well wooded surface and fertile soil. It is intersected by the Kentucky Central railroad. The chief productions in 1870 were 37,203 bushels of wheat, 19,355 of rye, 578,938 of Indian corn, 46,560 of oats, 29,453 of potatoes, 161,343 lbs. of butter, 24,948 of wool, and 1,651,593 of tobacco. There were 4,269 horses, 2,774 milch cows, 3,665 other cattle, 7,307 sheep, and 18,752 swine. Capital, Falmouth.

PENDLETON, Edmund, an American statesman, born in Caroline co., Va., Sept. 9, 1721, died in Richmond, Oct. 23, 1803. He began his career as an apprentice in the clerk's office of Caroline co., in 1740 was made clerk of the county court martial, and in 1741 was licensed to practise law. In 1751 he became one of the county justices, and in 1752 was elected to the house of burgesses. In 1764 he was one of the committee appointed to memorialize the king, and in 1773 of the committee of correspondence. In 1774 he was elected to the colonial convention, consequent on the Boston port bill, and chosen by that convention to the first congress. In 1775 he presided over the colonial convention, and was appointed president of the committee of safety. In May, 1776, he again presided in the convention, and drew up the celebrated resolution of that body instructing the delegates from Virginia to propose in congress a declaration of independence. After the inauguration of the commonwealth he was called to preside over the first house of delegates, and was appointed by that body, in conjunction with Chancellor Wythe and Mr. Jefferson, to revise the colonial laws. He was the head of the committee of safety during the early part of the war. In March, 1777, by a fall of his horse, he received an injury of the hip joint which made him a cripple for life. In the same year he was reëlected speaker of the house of burgesses. On the organization of the chancery court that year, he was unanimously elected its president; and when, in 1779, the court of appeals was constituted, he also became its president. This last post he held till his death. He presided over the state convention of 1788, in which was to be considered the proposed constitution of the United States, and was a leading advocate of its adoption.

PENDS D'OREILLES. See Kalispels.

PENDULUM. See Clocks and Watches, and Mechanics.

PENDULUM, Horizontal, an instrument for measuring very weak attractive or repulsive forces; it can also be used for measuring slight changes of level, or minute variations in the dimensions of solid bodies. It combines the advantages of the ordinary pendulum with those of the torsion balance. The former instrument may be considered as a one-armed lever, which is retained in a vertical position by the attraction of gravitation; when acted on by an attractive or repulsive force in any except a vertical direction, it tends to be deflected from its normal position, and if the force be sufficiently powerful, an actual change of position will be observed. But this deflection can be accomplished only by lifting the pendulum bodily through a distance measured by the versed sine of the arc of deflection, and it is this fact which deprives the ordinary pendulum of sensitiveness to the action of weak attractive or repulsive forces. On the other hand, the ordinary pendulum obeys equally well a force emanating from a point in its immediate neighborhood, and that of one proceeding from an infinite distance, provided only these forces are virtually equal with respect to it; in other words, the distance of the point from which the force emanates exercises no effect on the final action, except to weaken it in direct proportion to the square of the distance. In the torsion balance (see Balance) these relations are reversed; it is a lever with two arms, and is retained in its position of rest only by the force of torsion, which can easily be reduced to a very minute quantity; hence it readily obeys attractive and repulsive forces to which the common pendulum is absolutely insensitive. But the point from which the force emanates must be in the immediate neighborhood of the end of one of its arms; for if it is situated at a great distance from the balance, it will act with equal power on both arms, and these actions, being contrary and opposed, will neutralize each other, and no effect will be observed.—The horizontal pendulum combines the advantages of the ordinary pendulum and of the torsion balance. Let R R represent an inflexible rod of steel placed horizontally, and supported at its extremities by pivots on which it turns freely, and let W be a weight inflexibly attached to the rod, as indicated in fig. 1. It is evident that W A when left to itself will assume a vertical position, and that the whole apparatus will essentially constitute an ordinary pendulum. If now an attractive or repulsive force be made to act on W, the pendulum will tend to be deflected from its vertical position; and if the force is sufficiently powerful, a sensible deflection will be observed. In an arrangement of this kind, aside from friction, the opposing force to be overcome will of course be the attraction of gravitation; if however we gradually elevate the rod R R by one end, the gravity component will diminish, and finally become zero when R R is vertical, and consequently A W horizontal. Zöllner has shown experimentally how this may be accomplished to an almost incredible extent, so that an apparatus of this general nature in his hands became capable of obeying even the feeble attractive force of the moon.

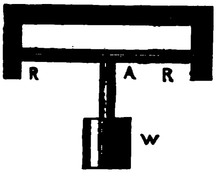


Fig. 1.

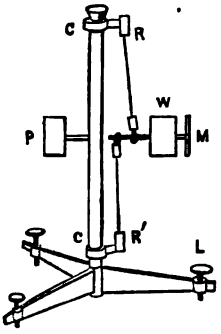


Fig. 2.—Zöllner's Horizontal Pendulum.

Fig. 2 represents Zöllner's horizontal pendulum. At W is the weight, the inflexible rod being replaced by fine steel wire or watch spring, stretched as shown on the vertical column C C, the whole being supported by a tripod provided with levelling screws. P is a counterpoise, and M a mirror for reflecting the divisions of a distant scale to a telescope, together constituting an arrangement for magnifying the motion of the pendulum. The apparatus shown in fig. 2 was made of brass, its height being about 30 in.; it was mounted on a pier like an astronomical instrument, and enclosed in a small separate building by itself, the observations being made from without. An inspection of the drawing shows that by turning the levelling screw L it is possible to bring the line joining R and R′ more and more into a vertical position, and that when this has been accomplished the pendulum will be controlled only by the torsion of the suspension springs. In practice this state of things is never actually realized, but may be closely approximated to, so that by the extreme sensitiveness to attraction of this instrument it becomes possible to obtain measures of the masses and distances of the sun and moon, expressed in units of the mass and semi-diameter of the earth. Zöllner has also suggested that since this pendulum obeys the action of the sun, or moves with it, it may in this way be possible to determine whether the pendulum keeps accurate pace with the apparent motion of the sun; that is, whether the attraction of gravitation requires time for propagation. Thus, for example, if it is found practicable to determine the position of the pendulum when on the meridian accurately to a minute of time, this would furnish the astronomer with a means of measuring the velocity of gravitation, even if it were eight times as great as that of light. Up to the present time he has published only a few observations made with his apparatus; the most important were taken on the evening of Sept. 18, 1870, from 6h. 35m. to 10h. 35m.; during the first hour the pendulum moved over $2\frac{8}{10}$ scale divisions, and during the remaining three hours over $3\frac{2}{10}$. In these observations the gravity component was still considerable, the pendulum consuming only 14·44 seconds for one oscillation; still they point to an important future for the new instrument, and prove incidentally that with it even in its present state it is possible to observe a change in level as small as $\frac{1}{1000}$ of a second of arc, an achievement the magnitude of which becomes evident when we remember that with the best spirit level one can barely estimate $\frac{1}{10}$ of a second. Vibrations are a source of great difficulty in using this instrument, and in the experiments above referred to prevented Zöllner from rendering it more sensitive; as he remarks, observations of this character would best be conducted under the surface of the earth, as in a mine, where the temperature would remain constant, and the support be free from tremors; so that, paradoxical as it at first sight may appear, it really is possible to have a useful subterranean astronomical observatory.—As Zöllner was in the act of printing his first description of the horizontal pendulum, he found that an instrument of the same kind had been described ten years previously by a French physicist, M. Perrot, in the *Comptes rendus;* and further investigation brought to light the curious fact that as far back as 1832 a German, Lorenz Hengler, subsequently a Catholic priest, had not only invented and described the horizontal pendulum in Dingler's *Polytechnisches Journal*, but had also made with it a series of observations on the attractive force of the moon. This publication attracted no attention owing to the backward condition of physical astronomy at that period, and was soon entirely forgotten.—The writer of this article, by suitable alterations and additions, has converted the horizontal pendulum into an instrument of unprecedented delicacy for measuring minute changes in the dimensions of solid bodies. By the application of braces the natural tendency of Zöllner's instrument to vibrate has been greatly reduced, and it has been provided with a means of bringing the pendulum to rest without friction; spring stops, an index, and micrometer have also been added, and the size diminished. The reach of the most powerful microscope is hardly more than $\frac{1}{150.000}$ of an inch, and the best mechanical means scarcely reach beyond $\frac{1}{300.000}$ of an inch; but in a set of linear determinations made with this modified pendulum, the probable error of the measurements proved to be only $\frac{1}{36.304.000}$ of an inch.—For further details, see Poggendorff's *Annalen* for November, 1873, and the "American Journal of Science" for June, 1875.

PENELOPE, a gallinaceous bird. See GUAN.

PENELOPE, the wife of Ulysses and mother of Telemachus. She was the daughter of Icarius, and having many suitors, her father promised to give her to the one who should conquer in a foot race. The victor was Ulysses, and when her father urged her to remain with him and not accompany her husband to Ithaca, the hero gave her leave to do as she pleased. She indicated her resolution to go with him by covering her face with a veil to hide her blushes. While Ulysses was at the siege of Troy she was surrounded by importunate suitors, whom she deceived by declaring that she must finish a shroud which she was weaving for her aged father-in-law, Laërtes, before she could make up her mind. But she unravelled each night all that she had done during the day; and when at last the suitors discovered her stratagem, Ulysses opportunely arrived after 20 years' absence and killed them all. Some writers later than Homer allege that by Mercury, or by all the suitors together, she became the mother of Pan, and was repudiated by her husband on his return from Troy; whereupon she went to Sparta, and thence to Mantinea, where her tomb was shown in after times.

PENEUS. See THESSALY.

PENGUIN, a subfamily of web-footed, imperfectly winged birds, inhabiting the seas around the rocky coasts, islands, and ice fields of the southern Pacific ocean, and the extreme portions of South America and Africa. Some of the earlier writers give this name to the auk (*alca*, Linn.) of the arctic seas, but it will here be restricted to its more modern application to the antarctic subfamily.—In the genus *aptenodytes* (Forst.) the bill is slender, longer than the head, compressed on the sides, and slightly curved at the point, which is acute; the upper mandible is clothed with short close-set plumes as far as the nostrils, which are in a lateral groove in the middle of the bill, and the lower is covered with a smooth naked skin; the wings are very small, fin-shaped, without quill feathers, having only short imbricated plumes with flattened shafts, and are unfit for flight; the tail is very short and flat, of narrow rigid feathers; the tarsi very short and flattened; the toes short and depressed, the anterior united by a web, and the hind one very small and almost entirely connected to the inner side of the tarsus; the claws large, flat, and slightly curved. As in the other genera, the breast bone is deeply incised behind on each side; the scapula is large and broad, and flat behind; the bones of the forearm and arm are very flat, the former making with the latter a rather obtuse angle; the feet are very far back, and the whole posterior surface of the tarsus touches the ground when the bird stands; the bones are heavy, filled with marrow, and without air cavities. The Patagonian penguins of Shaw and Pennant were different birds to which the same name had been given; to avoid confusion G. R. Gray calls one the emperor and the other the king penguin, or *A. Forsteri* and *A. Pennantii.* In the former the length is 50 in. and the bill 5, in the latter 44 and 4½; the general color of both is slate above and white below, with the head and throat black, the latter in the first species divided in front by a point of the white feathers of the chest, and in the second ending in a blunt point; there is an orange-yellow stripe on the sides of the head, descending and passing gradually in the former and suddenly in the latter into the white of the

King Penguin (Aptenodytes Pennantii).

chest. The plumage is soft and close, with a silvery gloss below, this part being used by fur dealers for tippets and collars; the neck is short and stout, the skin hard and thick, and the belly loaded with fat. They are found in immense numbers about the straits of Magellan, the Falkland islands, and the eastern groups of the South Pacific islands; they arrange themselves when on shore (which is only during the breeding season) in regular ranks like soldiers, classed strictly according as they are young, moulting, incubating, or with perfect plumage, those of one class not being permitted to intrude upon another. They present a strange appearance as they sit upright; they employ their wings like anterior limbs on land, crawling along on the belly pretty fast to and from their breeding places in the manner of quadrupeds; they are excellent swimmers, and fly swiftly under water, using their wings as fins, and breasting the most violent waves; though stupid and rather helpless, they often boldly attack intruders on their breeding places, inflicting severe wounds with their sharp bills; the food is principally animal, consisting of fishes and crustaceans. The eggs are laid on the ground or in holes, and are hatched by keeping them close between the thighs; the males collect food for the females, which become very fat during incubation; the young birds also get very fat before they quit the breeding places, which are covered with excrements and remains of dead birds, accumulated into heaps of guano during many successive years. The flesh of the penguin, though black and fishy, is considered eatable by hungry mariners.—In the genus *catarrhactes* (Briss.) the bill is moderate, strong, compressed, grooved on the sides, and slightly hooked at the tip, with the end of the lower mandible truncated; the tail is long, of narrow rigid feathers; the toes are long and strong. Several species are described, inhabiting in small parties the southern ocean, in open water or on fields of ice, sometimes more than 300 m. from land; they go to the shore only in the breeding season; they are more active, if possible, than the preceding genus, and swim and dive with great quickness; their cries are harsh and discordant, resembling the bray of a donkey. The crested penguin (*C. chrysocome*, Gmel.) is as large as a stout duck, black above and white below, with a yellowish white crest on each side of the head, and red bill and feet; it inhabits the vicinity of the Falkland islands and Tasmania.—In the genus *spheniscus* (Briss.) the bill is much as in the last, with a more hooked tip and the nostrils uncovered in the middle of the lateral groove; the tail and tarsi are very short, and the toes and claws long. The species are few, found about the rocky islands of the southern ocean, and on the W. coast of South America and Africa; the habits are the same as in the preceding genera. The Cape or jackass penguin (*S. demersus*, Gmel.), from the Cape of Good Hope, is black above and white below, with a white stripe over the eyes, the throat black, and a black line on the breast continued along each flank; the bill is brown, with a white band across the middle of its length; the length is 21 in.; its common name is derived from the resemblance of its voice to a bray. It comes to the surface of the water to breathe with such a spring and dives again so quickly, that it seems more like a fish leaping for sport than a bird. The Magellanic penguin (*S. Magellanicus*, Forst.) is 2 ft. long, and sometimes weighs 20 or 30 lbs.; the general color is black above and white below, with white streaks on the sides of the head and a black band on the breast; it is found about the southern parts of South America, and is well known to navigators, who have long been in the habit of invading its breeding places, and killing the birds for food or for sport.

Crested Penguin (Catarrhactes chrysocome).

Cape Penguin (Spheniscus demersus).

PENIKESE ISLAND. See Elizabeth Islands.

PENN, Granville, an English author, born in Philadelphia, Pa., Dec. 9, 1761, died at Stoke Park, Buckinghamshire, Sept. 28, 1844. He was the grandson of William Penn, served for a time as clerk in the British war office, and in 1834 came into possession of the family estates. He wrote "Critical Remarks on Isaiah vii. 18" (1799); "Remarks on the Eastern Origination of Mankind, and of the Arts of Cultivated Life" (1799); "A Comparative Estimate of the Mineral and Mosaic Genealogies" (1822); "Memorials of the Professional Life and Times of Admiral Sir William Penn" (2 vols., 1833); and many other works, the most important being a translation of the New Testament with annotations, entitled "The Book of the New Covenant" (3 vols., London, 1836–'8).

PENN, Sir **William,** an English admiral, born in Bristol in 1621, died in Wanstead, Essex, Sept. 16, 1670. He early entered the naval service, and before he was 32 years old had become vice admiral of England and general. He was one of the commanders in the expedition that took Jamaica from the Spaniards in 1655, and on his return in the same year was elected to parliament. In 1660 he was made commissioner of the navy, governor of Kinsale, vice admiral of Munster, and a member of the council of that province. He was also knighted. Entering the naval service again in 1664, he was captain-commander under the duke of York in the victory gained over the Dutch off Lowestoft in 1665. He left the naval service in 1666, but retained his other offices till 1669.

PENN, William, the founder of Pennsylvania, born in London, Oct. 14, 1644, died at Ruscombe, Berkshire, July 30, 1718. He was the son of Admiral Penn, who married Margaret, daughter of John Jasper, a merchant of Rotterdam. William Penn received his first education at the free grammar school of Chigwell, Essex, where he experienced strong religious impressions, and regarded himself as called to a consecration to the service of God. At the age of 12 he was removed from Chigwell to receive private instruction at home, and three years later entered Christ Church college, Oxford. While in college, through the influence of Thomas Loe, he became a convert to Quakerism, and not only refused to conform to the worship of the established church or to wear the surplice of a student, but, with some of his companions who had embraced his principles, assaulted several of the students in public and stripped from them their robes. For this outrage he was expelled, and on his return home his father, who was aiming at a peerage, beat him and drove him from the house. A reconciliation soon took place, and in 1662 the admiral sent his son to France, in hopes that the gayety of Paris might counteract the soberness of his Quakerism. The youth, however, had no taste for dissipation, and preferred to study theology at Saumur under Amyraut. After travelling as far as Turin he was recalled by his father in 1664. Without losing his religious seriousness, he had acquired on the continent more polish and courtesy and liveliness of manners. In compliance with his father's wishes he entered as a student of law at Lincoln's Inn, but shortly after was driven from London by the great plague of 1665. Under the influence of that terrible visitation his religious impressions acquired redoubled force. His father made another effort to change these tendencies by sending him to Ireland, and committing to him the management of two large estates in the county of Cork. Penn executed this charge to the entire satisfaction of his father; but again encountering Thomas Loe at Cork, he was induced to attend Quaker meetings, at one of which, Sept. 3, 1667, he was apprehended with others and carried before the mayor, on a charge of attending unlawful assemblies. Refusing to give bonds for good behavior, he was sent to prison; but he wrote to the lord president of the council of Munster, who procured his immediate discharge. From this time he identified himself with the Quakers in everything except costume, and on returning to England soon after became involved in disputes with his father, who finally offered to tolerate every other peculiarity if his son would only agree to remove his hat in his presence and in that of the king and the duke of York. Penn, after deliberation and prayer, declared that he could not remove his hat by way of compliment to any one; and his father at once turned him out of doors. Penn soon became a prominent preacher at the meetings of the Friends. Through the influence of his mother his father's indignation was so far softened that he permitted his son to return home, and used his interest with the government to relieve him from persecution. In 1668 Penn made his first appearance as an author by issuing a crude and acrimonious treatise, entitled "Truth Exalted, in a short but sure Testimony against all those religious Faiths and Worships that have been formed and followed in the darkness of Apostasy; and for that Glorious Light which is now risen and shines forth in the Life and Doctrine of the despised Quakers as the alone good old way of Life and Salvation. Presented to Princes, Priests, and People, that they may repent, believe, and obey. By William Penn, whom Divine Love constrains in an holy contempt to trample on Egypt's glory, not fearing the King's wrath, having beheld the Majesty of Him who is invisible." This was followed by a considerable number of tracts on similar topics, which with his other writings were collected and published by Joseph Besse (2 vols. fol., London, 1726). In 1668 he also published "The Sandy Foundation Shaken," an attack upon "those so generally believed and applauded doctrines of one God subsisting in three distinct and separate persons; of the impossibility of God's pardoning sinners without a plenary satisfaction; and of the justification of impure persons by an im-putative righteousness." This work caused a great excitement by its bold opposition to the doctrine of the Trinity as commonly received, and Penn was apprehended and imprisoned in the tower for nine months, during which he wrote his principal and most popular theological work, "No Cross, no Crown; a discourse showing the Nature and Discipline of the Holy Cross of Christ." By the interference of the duke of York he was at length released and permitted to live in his father's house. The admiral would not admit him to his presence, but he gave him through his mother a commission to go again to Ireland to look after his estates. On his return Penn was reconciled to his father, and lived with him on good terms till the latter's death in September, 1670. Before that event the son had once more been arrested for preaching in the streets; but the jury, after a remarkable trial (during which they were kept for two days and nights without food, fire, or water), brought in a verdict of not guilty, for which each juryman was fined 40 marks and sent to Newgate; while Penn and his companion were also fined and imprisoned for contempt in wearing their hats in presence of the court. They appealed to the court of common pleas, where the decision of the lower court was reversed, and the great principle of English law established that it is the right of the jury to judge of the evidence independent of the dictation or direction of the court. The admiral bequeathed to his son an estate of £1,500 a year, with large claims against the government; and thenceforth the cares of business and the duties of his lay ministry seem to have equally divided the time of Penn. In March, 1671, while preaching in a meeting house in London, he was arrested and committed to the tower, and was soon afterward tried under the conventicle act, but acquitted for want of testimony. The magistrates, however, required him to take the oath of allegiance, which he refused to do from conscientious scruples about swearing, and was sentenced to Newgate for six months. While in prison he wrote and published four treatises, one of them entitled "The great Case of Liberty of Conscience," which is a good comprehensive statement of the principle of religious toleration. On regaining his liberty he made a tour in Holland and Germany, interceding with the rulers of those countries in behalf of the persecuted Quakers; and on his return home in the beginning of 1672 he married Gulielma Maria, daughter of Sir William Springett, and went to reside at Rickmansworth in Hertfordshire, but afterward settled at Dorminghurst, Sussex. The next few years were devoted to preaching and to defending by his pen the doctrines of the Quakers from various assailants, in reply to whom he published a numerous series of laborious tracts and books. In 1674 a dispute between Fenwick and Byllinge, both Quakers, about their proprietary rights in the New Jersey Quaker colonies, being submitted to Penn, he decided in favor of Byllinge, who subsequently, being too much embarrassed to improve his property, made it over to Penn and two of his creditors as trustees. Penn immediately engaged with zeal in the work of colonization, and in 1681 obtained from the crown, in payment of a debt of £16,000 due to his father, a patent for the territory now forming the state of Pennsylvania. The charter vested the perpetual proprietaryship of this vast region in him and his heirs, on the fealty of the annual payment of two beaver skins. He designed at first to call his territory New Wales, and afterward suggested Sylvania as applicable to a land covered with forests; but the king peremptorily ordered the name Pennsylvania to be inserted, in honor, as he said, of his late friend the admiral, William Penn having in vain asked the secretary to change the name, lest it should subject him to the imputation of vanity, and even offered him 20 guineas for so doing. In February, 1682, Penn became, with 11 others, a joint purchaser of East Jersey, which was already a flourishing colony. Aided by the advice of Sir William Jones, and of Henry, the brother of Algernon Sidney, he drew up a liberal scheme of government and laws for his colony, and in September, 1682, embarked for the Delaware, reaching that river after a voyage of six weeks. He was received with great enthusiasm, and after several meetings for conference and treaties with the Indians, he made his famous treaty with them under a large elm tree at Shackamaxon, now Kensington, probably on the last day of November, 1682. A numerous assembly of the Delawares, Mingoes, and other Susquehanna tribes met on this occasion, and formed with the Quakers a treaty of peace and friendship, the only treaty, says Voltaire, "never sworn to and never broken." Soon afterward he laid out the plan of Philadelphia, to which he gave its name in the hope that brotherly love might characterize its inhabitants. He purchased the land where the city stands of the Swedes, who had purchased it of the Indians. He now devoted himself zealously to his duties as governor, and made treaties with 19 Indian tribes; and so long as any of the aborigines remained in Pennsylvania or its neighborhood, their traditions bore testimony to the strong impression which the justice and benevolence of Mignon, as the Delawares called him, or of Onas, as he was styled by the Iroquois, made on their savage hearts. Penn visited New York and New Jersey; and after meeting with the general assembly of the province at New Castle in May, 1684, he intrusted his government to a council, and in August sailed for England, leaving a prosperous colony of 7,000 people. During his absence the Quakers had suffered severe persecution in England, and Penn's first care was to intercede in their behalf with the king, from whom he obtained the promise of entire relief at an early period. Charles II.

died Feb. 6, 1685. James II., who succeeded, had been the pupil in naval affairs of Penn's father, and was his own intimate friend. Penn took lodgings at Kensington to be near the court, upon which he constantly attended, and where he had such influence that his house was thronged by hundreds of suitors asking his intercession in their behalf. His intimacy with the king led to foolish suspicions that he was secretly a Jesuit, and in April, 1685, he published a pamphlet entitled "Fiction Found Out," to rebut the charge. In 1686, partly through his influence, a proclamation was issued by the king and council for the release of those imprisoned on account of religion, and upward of 1,200 Quakers were set free. This was followed in April, 1687, by a proclamation declaring liberty of conscience to all, and removing all tests and penalties. Penn meanwhile made a tour on the continent, during which by order of the king he had a conference with William, prince of Orange, whom he endeavored to convert to his views of universal toleration. Soon after the revolution of 1688 Penn was called before the council to answer to a charge of treason; but no evidence appearing against him, he was discharged. Subsequently, a letter from the exiled James requesting him to come to France having been intercepted, he was again brought before the council in presence of King William; but after a long examination, in which he declared his friendship for James though he did not approve his policy, and said he could not prevent him from writing to him, he was discharged. A third time, in 1690, he was arrested on a charge of conspiracy, tried by the court of king's bench, and acquitted. In 1691 the charge was renewed by an informer named Fuller, whom the house of commons afterward branded as a cheat, a rogue, and a false accuser; and Penn concealed himself to avoid arrest. Meantime Pennsylvania had been greatly disturbed by civil and religious quarrels, and in October, 1692, the king and queen deprived Penn of his authority as governor, and directed Gov. Fletcher of New York to assume the administration of Pennsylvania. Powerful friends, among them Locke, Tillotson, and the duke of Buckingham, now interceded in Penn's behalf with the king; and he had a hearing before the council on the charges against him, and was honorably acquitted in November, 1693. In February, 1694, his wife died, and he bore testimony to her virtuous life and Christian death in "An Account of the Blessed End of my dear wife Gulielma Maria Penn." Within two years he married Hannah Callowhill, a Quaker lady. His government was restored to him in August, 1694; and in September, 1699, he sailed on a second visit to America, accompanied by his wife and daughter. He found the colony prosperous, and was warmly received. He immediately gave his earnest attention to various reforms, and especially to the amelioration of the condition of the Indians and negroes. Tidings from England that a measure was pending before the house of lords for bringing all the proprietary governments under the crown, led him to return to England in 1701. One of his last official acts was to make Philadelphia a city by a charter signed Oct. 25, 1701. Soon after his arrival in England the project of bringing the proprietary governments under the crown was dropped. For several years after this he was involved in great trouble by the affairs of Pennsylvania, where his son, whom he had sent there as his representative, had disgraced him by vicious and riotous conduct; while his trusted agent in London, a Quaker named Ford, left to his executors false claims against Penn to a very large amount. To avoid extortion Penn suffered himself to be committed to the Fleet prison in 1708, where he remained a long time, till his friends compounded with his creditors. In 1712 he had made arrangements for the transfer to the crown of his rights as proprietor for £12,000, when he sustained repeated shocks of paralysis; and though he lived six years longer, he never regained his mental vigor, and for much of that period was deprived of memory and of the power of motion. He was interred in Jordan's burial ground, near the village of Chalfont St. Giles, in Buckinghamshire.—The reputation of William Penn in his own day did not escape suspicion and censure. The extraordinary mingling of Quaker simplicity and court influence which marked his life gave rise to many imputations, which have been revived with much force and pertinacity by Macaulay in his "History of England." Admitting that Penn was without doubt a man of eminent virtues; that he had a strong sense of religious duty and a fervent desire to promote the happiness of mankind; that on one or two points of high importance he had notions more correct than were in his day common even among men of enlarged minds; and that he will always be mentioned with honor as the founder of a colony who did not in his dealings with a savage people abuse the strength derived from civilization, and as a lawgiver who, in an age of persecution, made religious liberty the corner stone of a polity, the English historian alleges that "his writings and his life furnish abundant proofs that he was not a man of strong sense. He had no skill in reading the characters of others. His confidence in persons less virtuous than himself led him into great errors and misfortunes. His enthusiasm for one great principle sometimes impelled him to violate other great principles which he ought to have held sacred. Nor was his integrity altogether proof against the tempations to which it was exposed in that splendid and polite, but deeply corrupted society with which he now mingled. . . . . Unhappily it cannot be concealed that he bore a chief part in some transactions condemned, not merely by the rigid code of the society to which he belonged, but by the general sense of all honest men. He afterward solemnly protested that his hands were pure from illicit gain, and that he never received any gratuity from those whom he had obliged, though he might easily, while his influence at court lasted, have made £120,000. To this assertion full credit is due. But bribes may be offered to vanity as well as to cupidity; and it is impossible to deny that Penn was cajoled into bearing a part in some unjustifiable transactions of which others enjoyed the profits." Among the transactions to which Macaulay here alludes was an attempt to persuade Dr. Hough, president of Magdalen college, Oxford, to comply with the wishes of King James in a matter where compliance would have involved a violation of his official oath, by holding out to him the bait of a bishopric. But Dr. Hough himself, in his account of the conversation with Penn, intimates that the Quaker was only speaking in jest—"had a mind to droll upon us." A more serious charge is that Penn was an agent of the rapacious maids of honor of the royal court to extort money for pardons from the relatives of some young girls at Taunton who were implicated in Monmouth's rebellion. The only foundation for this charge is a letter relating to the transaction written by the earl of Sunderland, which begins thus: "Mr. Penne, her majesty's maids of honor having acquainted me that they design you and Mr. Walden in making a composition with the relations of the maids of Taunton;" and Macaulay assumed without hesitation that the person to whom it was addressed was William Penn. But it has been proved by the registers of the privy council, that at this very time a certain George Penne was engaged as a pardon broker at Taunton, and it is most probable that the letter was addressed to him. In the edition of 1858 Macaulay considers the strictures on his previous statements, and says: "If I thought that I had committed an error, I should have, I hope, the honesty to acknowledge it; but after full consideration, I am satisfied that Sunderland's letter was addressed to William Penn."—See the memoirs of Penn by Marsillac (Paris, 1791; translated into German by Friedrich, Strasburg, 1793), Clarkson (London, 1818), Joseph Barker (London, 1847), and George E. Ellis, in Sparks's "American Biography," 2d series, vol. xii. (Boston, 1852); S. M. Janney, "Life and Select Correspondence of William Penn" (Philadelphia, 1852); Hepworth Dixon's "Life of Penn" (new ed., London, 1856); and "Inquiry into the Evidence of the Charges brought by Lord Macaulay against William Penn," by J. Paget (Edinburgh, 1858).

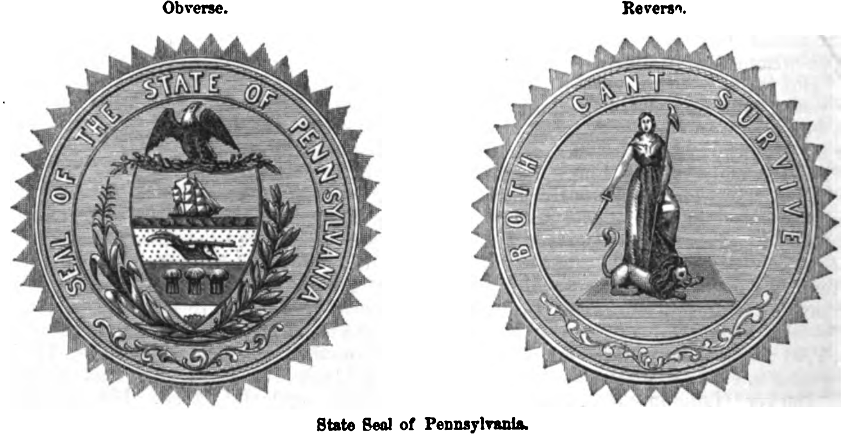
PENNACOOKS. See MASSACHUSETTS INDIANS.

PENNAFORT, Raymond de, Saint, a Spanish canonist, born in the castle of Pennafort, near Barcelona, in 1175, died in that city, Jan. 6, 1275. He opened a free school of philosophy in his native city at the age of 20, went to Bologna to perfect himself in theology and canon law, and was appointed professor there. Berenger, bishop of Barcelona, recalled him, and appointed him archdeacon of his cathedral, and he joined the friars preachers in 1222. Soon afterward by order of his superiors he composed his *Summa Casuum Conscientiæ*, the first known compendium of moral theology. Among the distinguished men who chose him for spiritual adviser were St. Peter Nolasco, with whom he coöperated in founding the order of mercy for the redemption of captives, and James I., king of Aragon, whom he induced to separate from his wife Eleonora of Castile because she was his first cousin. In 1230 he was invited to Rome by Pope Gregory IX., and appointed private chaplain and grand penitentiary. By the pope's direction, he made a collection of the papal decretal letters since 1150, the year with which Gratian's compilation closed. In 1135 he declined the archbishopric of Tarragona, and was allowed to return to his convent in Spain. He became general of his order in 1238, revised its constitutions and rule, and introduced some ameliorations, which were adopted by the general chapter. In 1240 he resigned his office, and devoted himself to preaching. He was instrumental in establishing the inquisition in Aragon and southern France, and urged the kings of Aragon and Castile to undertake a crusade against the Moors, which resulted in their expulsion from the Balearic isles and the kingdom of Valencia. He promoted the study of Hebrew and Arabic in the Dominican schools, and directed Thomas Aquinas to write his *Summa contra Gentes*. He was canonized in 1601, and his feast is celebrated on Jan. 23. The collection of decretals made by Raymond de Pennafort is in five books. (See CANON LAW, vol. iii., p. 719.) Besides the above named works, he also composed *Summa de Pœnitentia et Matrimonio*, of which the best edition is that by Laget (fol., Lyons, 1718, and Verona, 1744). His life was written in Latin by Penna (Rome, 1601), and in French by Touron, in vol. i. of *Histoire des hommes illustres de l'ordre de Saint Dominique* (6 vols., Paris, 1743–'9).

PENNANT, Thomas, an English naturalist, born at Downing, Flintshire, June 14, 1726, died there, Dec. 16, 1798. He was educated at Wrexham and at Oxford. His account of an earthquake in Flintshire, April 2, 1750, appeared without his knowledge in the "Philosophical Transactions;" and in 1756 he contributed to the same work an article on certain coralloid bodies occurring in Shropshire. In 1761 appeared the first part of his great work on "British Zoölogy." This treatise, which was translated into Latin and German, embraced nearly every species of the animal kingdom then known to exist in Britain, with the exception of insects. The best edition is that of 1812 (4 vols. 8vo). After travelling on the continent he began a work on "Indian Zoology" (1769), which was speedily discontinued. He made a journey into the northern part of Scotland in 1769, and another in 1772, of both of which he published accounts. In the second journey he was accompanied by Dr. Lightfoot, whom he assisted in the preparation of his "Flora Scotica." In 1771 appeared his "Synopsis of Quadrupeds," subsequently enlarged under the title of a "History of Quadrupeds." Shortly afterward he began "The Genera of Birds," which was never completed. His "Arctic Zoölogy" (3 vols. 4to, 1784-'7) contains descriptions of many species previously unknown. In 1793 he published "The Literary Life of the late Thomas Pennant," saying in the advertisement that his existence as an author ended March 1, 1791. Yet he published several other works, among which were "Outlines of the Globe," vols. i. and ii., including "Views of Hindostan" (1798), forming the first portions of a work designed to embrace an account of every country in the world. Two additional volumes were issued after his decease by his son, completing eastern Asia. Pennant also wrote "A Tour in Wales" (4to, 1778-'81); "A Journey from Chester to London" (1782); an "Account of London" (1790); and the "History of the Parishes of Whiteford and Holywell" (1796). A collective edition of his works was published in 1823, in 29 volumes.

PENNANT'S MARTEN. See Fisher.

PENNSYLVANIA, one of the thirteen original states of the American Union, included in the middle states, and now the second in wealth and population. As it was the seventh in geographical order of the original thirteen, it came to be called the "keystone state." Pennsylvania was somewhat indefinitely bounded as originally granted by charter; but in the final adjustment of colonial limits it was made a nearly perfect parallelogram W. of the Delaware river, a small addition being made at its point of contact with Lake Erie to give it access to lake navigation and a good harbor. The state lies between lat. 39° 43′ and 42°, except that the small portion bordering on Lake Erie extends N. to 42° 15′, and lon. 74° 40′ and 80° 36′. It is bounded N. by Lake Erie and New York; E. by New York and New Jersey, from which it is separated by the Delaware river; S. by Delaware, Maryland, and West Virginia; and W. by West Virginia and Ohio. The extreme length E. and W. is 315 m., average 270 m.; general width, 158 m.; area, about 43,000 sq. m. The state is divided into 66 counties, viz.: Adams, Allegheny, Armstrong, Beaver, Bedford, Berks, Blair, Bradford, Bucks, Butler, Cambria, Cameron, Carbon, Centre, Chester, Clarion, Clearfield, Clinton, Columbia, Crawford, Cumberland, Dauphin, Delaware, Elk, Erie, Fayette, Forest, Franklin, Fulton, Greene, Huntingdon, Indiana, Jefferson, Juniata, Lancaster, Lawrence, Lebanon, Lehigh, Luzerne, Lycoming, McKean, Mercer, Mifflin, Monroe, Montgomery, Montour, Northampton, Northumberland, Perry, Philadelphia, Pike, Potter, Schuylkill, Snyder, Somerset, Sullivan, Susquehanna, Tioga, Union, Venango, Warren, Washington, Wayne, Westmoreland, Wyoming, York. Harrisburg, the capital, had 23,104 inhabitants in 1870, and Philadelphia, the largest city, 674,022. The other cities, according to the census of 1870, were Allegheny, with 53,180 inhabitants; Allentown, 13,884; Altoona, 10,610; Carbondale, 6,393; Chester, 9,485; Columbia, 6,461; Corry, 6,809; Erie, 19,646; Franklin, 3,908; Lancaster, 20,233; Lock Haven, 6,986; Meadville, 7,103; Pittsburgh, 86,076; Reading, 33,930; Scranton, 35,092; Titusville, 8,639; Williamsport, 16,030; and York, 11,003. The most populous boroughs were Ashland, 5,714; Bethlehem, 4,512; Birmingham, 8,603; Carlisle, 6,650; Chambersburg, 6,308; Danville, 8,436; East Birmingham, 9,488; Easton, 10,987; Johnstown, 6,028; Lebanon, 6,727; Mahanoy, 5,533; New Castle, 6,164; Norristown, 10,753; Pottsville, 12,384; St. Clair, 5,726; Tamaqua, 5,960; and Wilkesbarre, 10,174. The population of the state and its rank in the Union, according to the federal census, have been as follows:


Obverse. Reverse.

SEAL OF THE STATE OF PENNSYLVANIA
BOTH CANT SURVIVE

State Seal of Pennsylvania.

YEARS.	White.	Free colored.	Slave.	Total.	Rank.
1790..........	424,099	6,537	3,737	434,373	2
1800..........	586,095	14,564	1,706	602,365	2
1810..........	786,804	22,492	795	810,091	3
1820..........	1,017,094	30,202	211	1,047,507	3
1830..........	1,309,900	37,930	403	1,348,233	2
1840..........	1,676,115	47,854	64	1,724,033	2
1850..........	2,258,160	53,626	....	2,311,786	2
1860..........	2,849,259	56,949	....	2,906,215	2
1870..........	3,456,609	65,294	....	3,521,951	2

In 1875 the total population of the state was estimated at 3,941,400, including 70,000 colored. Included in the total for 1860 were 7 Indians, and in that for 1870 34 Indians and 14 Chinese. Of the total population in 1870, 1,758,499 were males and 1,763,452 females; 2,976,642 were of native and 545,309 of foreign birth. Of the natives, 2,726,712 were born in the state, 14,623 in Delaware, 28,910 in Maryland, 9,119 in Massachusetts, 36,694 in New Jersey, 87,876 in New York, 19,295 in Ohio, and 18,931 in Virginia and West Virginia. Of the foreigners, 10,022 were born in British America, 69,665 in England, 235,798 in Ireland, 16,846 in Scotland, 27,633 in Wales, 160,146 in Germany, 819 in Holland, and 5,765 in Switzerland. The density of population was 76·56 persons to the square mile. There were 675,408 families, with an average of 5·21 persons to each, and 635,680 dwellings, with an average of 5·54 to each. The increase of population from 1860 to 1870 was 21·19 per cent. In 1870 there were 540,133 males and 535,907 females from 5 to 18 years old, 679,506 males from 18 to 45, and 776,345 male citizens 21 years old and upward. Of the total population 10 years of age and over (2,597,809), there were engaged in all occupations 1,020,544; in agriculture, 200,051, including 68,897 laborers and 187,646 farmers and planters; in professional and personal services, 283,000, of whom 3,841 were clergymen, 84,343 domestic servants, 140,835 laborers, 3,253 lawyers, 4,848 physicians and surgeons, and 11,200 teachers; in trade and transportation, 121,253; in manufactures and mechanical and mining industries, 356,240, including 3,056 lumbermen and raftsmen, 6,963 operatives in iron and steel works, 6,956 iron and steel rolling-mill operatives, 8,249 machinists, 41,997 miners, and 7,294 woollen-mill operatives. The total number of deaths from all causes was 52,639, the ratio of mortality being 1·49 per cent.; from consumption 7,481, being one from that disease out of seven from all causes. There were 2,683 deaths from cholera infantum, 1,088 from croup, 901 from whooping cough, 2,773 from pneumonia, 5,645 from scarlet fever, 1,898 from enteric fever, and 250 from intermittent and remittent fevers.—The surface of Pennsylvania is level in the southeast, hilly and mountainous in the interior, and generally rolling or broken in the west. The southeastern counties are but little elevated above the sea, but in proceeding westward and northward a series of parallel ridges, from 1,500 to 2,500 ft. high, make a gently curving belt across the state, from N. E. to S. W., from 50 to 80 m. wide, and 200 m. long. The first of these ridges, called the South mountain, is a prolongation of the Blue Ridge of Virginia; and the last one, the highest, is the Alleghany mountain, from which the general slope is continuous toward Ohio. The northern rim skirts Lake Erie at an elevation of 1,000 ft. above the lake, which is about 650 ft. above tide. The drainage level at Pittsburgh is 800 ft. above tide. The Susquehanna river drains parts of the highland through tortuous cañons 1,000 ft. deep, and collects in a central valley, or rolling plain, which separates the group of anthracite coal mountains on the east from the wilderness of Devonian and Silurian mountains on the west, through which the Juniata river and its branches break, by numerous "narrows" or short gaps. The anthracite coal mountains form an elevated plateau, called the Pocono mountain, which is continued as the Catskill mountains to the Hudson. Through this plateau the Delaware river flows in a deep cañon. Each of the Appalachian ridges has a separate name, such as North, Blue, Kittatinny, Second, Peter's, Berry's, Mauch Chunk, Sharp, Locust, Mahanoy, Mahontongo, Big, Little, Shamokin, Nescopec, Shickshinny, Wyoming, Buck, Hell Kitchen, Yeager's, McCauley's, Montour, Buffalo, Jack's, Seven Mountains, Shade, Standing Stone, Tussey, Nittany, Bald Eagle, Dunning, Canoe, Hole, Hook, Will's, Savage, Black Log, Tuscarora, Path Valley mountain, &c. Negro, Chestnut, and Laurel ridges, 2,500 ft. high, are the only mountains west of the Alleghany Backbone. They pass out of the state at the southwest, into Maryland and Virginia. The ridges E. of the Alleghany range are too abrupt for cultivation, but its W. slope is nearly all arable, even at an elevation of 1,500 or 1,800 ft. The valleys of central Pennsylvania correspond to the mountain ridges in their general trend, and are transversely crossed by the great rivers, which pass to the sea by a series of zigzags. Chester valley in the southeast, Lebanon valley in the east, Wyoming valley in the northeast, Penn's and Juniata in the centre, Cumberland in the south, and Monongahela valley in the southwest, are the principal. Many other deep narrow valleys occur in the mountainous region. The Delaware river, forming the E. boundary of the state, has tide water 132 m. from the sea to Trenton, and great depth at Philadelphia, averaging at the wharf line more than 45 ft. It is navigable for the largest ships to Philadelphia, for large steamboats to Trenton, and for small steamboats to Easton. It breaks through the Kittatinny mountains at the Delaware Water Gap. The Susquehanna river drains the central part of the state, and runs southward to Chesapeake bay; it is a rapid, broad, and shallow river, not navigable for steamboats.

in Pennsylvania, but it floats great quantities of timber. Canals along its banks convey coal and produce in great quantities. The Susquehanna has two great branches, the North branch rising in New York, and having an irregular course of about 250 m. to Northumberland, the point of junction, and the West branch rising W. of the Alleghanies, through which it breaks eastward, 200 m. long. Below Northumberland, 150 m. from the sea, the course of this river is more direct. The Ohio river and its branches drain the W. part of the state; the Alleghany river branch drains the N. W. part, and has a length within the state of about 250 m., running mainly S. W. and S. E.; the Monongahela branch, rising in Virginia, has a course northward within the state of 80 m. to Pittsburgh. Both these last are navigable for steamboats about 60 m. each, the latter being converted into slackwater pools. The Ohio, below their point of junction, is a great thoroughfare for steam navigation. The Juniata, a tributary of the Susquehanna from the west, and the Lehigh and Schuylkill, tributaries of the Delaware, are the principal remaining rivers, each having canals and lock navigation. There is no considerable lake within the state, but it borders on Lake Erie for a distance of 45 m., affording access to its navigation and a superior harbor at Erie.—The geological formations of Pennsylvania are limited to three of the principal divisions of the rocks. These are: 1, the azoic and eozoic formations in the southeast; across which lies, 2, the mesozoic (new red) in a belt from 20 to 30 m. wide, extending into New Jersey and into Maryland; 3, the palæozoic series, from the Potsdam sandstone to the coal measures, occupying the rest of the state. The tertiary and upper secondary, developed on the E. side of the Delaware, do not extend to the other side of the river. The northern drift formation of sand and gravel, which overspreads all the states to the north, covers the N. and N. W. tier of counties, and is represented by a thin sheet of gravel, which dwindles away within 30 or 40 m. of the New York state line, except where it is traced down the valley of the Delaware at the east and the branches of the Ohio at the west. Along the middle portion of the N. boundary of the state the height of the table land appears to have been sufficient to prevent its deposit, for its bowlders and gravel are rarely detected in this portion of the state; but the valley beds and even hill tops of the N. W. counties are heavily loaded with drift. The gneissic rocks are limited to the S. E. counties, the gneiss occupying a margin of varying width along the Delaware below Trenton, at Philadelphia reaching up the Schuylkill about 10 m., and giving place on the northwest to a narrow belt of partially metamorphosed lower Silurian limestones, which separates it from the red sandstone. This contains the quarries of white marble that have supplied Philadelphia and the towns around. N. and N. W. of it gneiss overspreads the N. part of Chester co., and Laurentian gneiss is supposed to form the body of the Easton and Reading hills, and the South mountains west of Harrisburg. Near Phœnixville, in the new red, are the mines of lead and copper. (See LEAD.) On the range of the gneiss toward the southwest are the nickel mines in Lancaster co. Along the line of the gneiss and sandstone W. of Phœnixville are the Warwick and other mines of magnetic iron ore, and further N. the great Cornwall mine near Lebanon, and others around Reading. South from Philadelphia the gneiss continues round the border of the state, the edge of this formation N. of the Maryland state line coming to a point S. of Gettysburg in Adams co. Across this gneiss country, especially near the Octorara creek, run tracts of serpentine rocks, forming what are called the "serpentine barrens." In these rocks beds of chrome iron ore have been worked to a considerable extent, and at times with great profit, affording large quantities of the ore for the manufacture of chrome paints at Baltimore and for the English market. Trap dikes are of frequent occurrence, not only in the gneiss region, but especially in the belt of new red rocks overlying the older formations. The lower Silurian formations contain great deposits of hematite iron ore, as the Chestnut hill mines near Columbia in Lancaster co., and the numerous beds in Berks and Lehigh cos. which form the chief dependence of the blast furnaces on the Schuylkill and the Lehigh rivers; and the same lower Silurian limestones hold the same ores in Kishacoquillas, Brush, Nittany, Sinking, Spruce creek, and Canoe valleys, and Morrison's and McConnellsburg coves in central Pennsylvania. (See APPALACHIAN MOUNTAINS, and IRON.) The northern edge of the new red ranges with the Musconetcong creek in New Jersey, crosses the Delaware river below Durham, and extends W. across the Schuylkill 2 m. below Reading, and the Susquehanna 5 m. below Harrisburg. It then inclines more to the south and crosses the S. line of the state near the S. W. corner of Adams co., keeping always at the foot of the South mountain or Blue Ridge. The S. edge of the same belt enters the state opposite Trenton and pursues a general W. course, passing the Schuylkill 2 m. below Norristown, the Susquehanna in the W. corner of Lancaster co., and the state line in Adams co. near the S. E. corner. The tract thus included is occupied almost exclusively by the red sandstones, red shales, and conglomerates of this formation, and by the numerous dikes of trap rock, many of which are large and are traced for miles in different directions. It is remarkable that the dip of the sedimentary rocks is not disturbed by these dikes from the uniform inclination of the strata at angles varying from 5° to 20° toward the north and northwest. One of these dikes is remarkable not only for its straight course and extreme narrowness (sometimes only 4 ft.), but for the fact that it cuts transversely all the Silurian and Devonian formations for a distance of many miles, passing Carlisle and the mouth of the Juniata river. The sandstones afford some good building stones, of which there are quarries on the Swatara, Schuylkill, and Delaware. The divisions of the palæozoic series are given in the article GEOLOGY, vol. viii., p. 695; and they amount in aggregate thickness to over 35,000 ft. The lower members lie upon the N. W. flank and foot of the South mountain, and dip N. W. beneath the "auroral" magnesian lower Silurian limestones of the Kittatinny valley, which correspond to the Chazy, Birdseye, and Black river limestones of New York, and fill the broad valley between the Kittatinny and Blue mountains on one side and the South mountain on the other. Their range is marked by soil of great fertility, and the finest agricultural region of the state is this great limestone valley, occupying the chief portion of Northampton, Lehigh, Berks, Lebanon, Dauphin, Cumberland, and Franklin cos.; the N. half of the valley, however, is of Utica and Hudson river lower Silurian slate, containing the roofing slate quarries of the Delaware and Lehigh. Beyond this to the northwest ranges the central belt of upper Silurian and Devonian mountains and valleys above described, as far as the main Alleghany mountain, and its picturesque topography much resembles that of the Jura mountains in Switzerland. Long narrow ridges parallel to each other, often running many miles in straight lines and then curving together, and varied by the occasional termination of one of them upon the plain of the valleys that lie between them, are everywhere encountered over this region of middle Pennsylvania. The rivers and the roads follow and cross them alternately, finding a passage from one to another by the numerous gaps and around the ends of the ridges. The great pile of the palæozoic formations, raised and crumpled in long folds, the bearing of which is with the mountain ranges, presents its various members in regular succession; and each one of these along the line of its outcrop impresses its peculiar form of outline upon the surface. When the limestone belts, by reason of their enormous thickness or by their changing dips, are spread over a wide area, there is a valley between the steep ridges, in which the sandstones, that have more stoutly resisted the denuding action, form bold cliffs and give a sharp outline to the ridges. The same formations are frequently repeated until the main Alleghany mountain is reached, when the whole scene changes, and the traveller descending toward the west rides over and between innumerable rounded knobs and short irregular ridges, around the sides of which are the outcrops of the nearly horizontal bituminous coal beds. E. of the Alleghanies the coal measures are limited to the few deep, long, sharp, usually disconnected, but closely parallel anthracite basins, E. of the Susquehanna river; and to one semi-bituminous coal area occupying the high Broad Top mountain, S. of the Juniata river. Within each basin these strata present frequent changes of dip, the successive anticlinal and synclinal axes lying nearly on the general range of the basin, and the flexures being often sharp. (See ANTHRACITE.) The summit of the Alleghany mountain has already been described as the E. margin of the great bituminous coal field. The highest points are capped by the conglomerate which underlies the coal formation, or by the lower members of this series, and the strata dipping gently toward the west, the formation gains in thickness in that direction, overspreading the whole western part of the state, except the N. W. corner. (See COAL.) The useful mineral beds found interstratified with the coal are fire clay, limestone, iron ore, and sandstone. Fire clay underlies every coal bed. Three or four limestone beds from 2 to 10 ft. thick occur in the lower or Alleghany valley coal system, and heavy formations of limestone in the upper or Monongahela river coal system. Beds of clay ironstone are mined from between the lower coals at Johnstown and Brady's Bend, and from the base of the upper coal system in Westmoreland and Fayette counties. An important stratum of limonite furnished ore to all the charcoal furnaces of Armstrong, Butler, and Clarion cos.; it overlies the most important of the lower limestones. (See IRON.) Salt is obtained by boring through the coal formation of the western portion of the state, and this business is extensively carried on in the valley of the Kiskiminetas. The annual product of salt is estimated at about 1,000,000 bushels. Petroleum abounds in the upper Devonian rocks at a depth of about 1,000 ft. below the lowest coal bed in the Alleghany valley country, but fails in the extreme N. W. counties, and also toward the east. (See PETROLEUM.) Among the mineral springs those of Bedford are the most celebrated.—The soil of the state is generally rich, that of Lancaster co. on the limestone in the southeast, and of some of the counties bordering the Ohio river and also underlaid with limestone in the west, being particularly noted for productiveness. In the south and east, the abundance of lime constitutes good grain soils generally, and there are none of the thin tertiary sands, or of the weak soils lying on primary rocks, which belong to other states of the seaboard. The mountain valleys of the interior generally contain limestone, which secures good soils. In the north grazing soils preponderate; these are rich on the upper Susquehanna in the northeast, thin and cold on the highlands of the central counties of the N. border, and again very rich and productive in the northwest. The whole W. border of the state is, like the Ohio valley generally, alike adapted to grain and grazing.—The white pine forest of the Alleghany mountains has been a source of great wealth to the middle northern counties. Williamsport is the emporium of this trade. An equally extensive forest of hemlock covers Clearfield, Cambria, and parts of Somerset, Fayette, and Indiana cos. A forest of beech woods, traversed by laurel thickets, and broken by steppes of huckleberry bushes, covers the country of the upper Lehigh, and still bears the name of the "Shades of Death." The botanist Michaux has made famous the variety of species of oaks of Pennsylvania. Very large groves of cherry and black walnut still exist. The sugar maple is abundant. Other species of maple cover all the mountains in the state. The American poplar or whitewood, the gum, elm, persimmon, and other trees abound. Maize is universally grown between the Alleghany mountains and the Delaware river. Tobacco is successfully cultivated in Lancaster co. Wheat and rye cover the surface of every valley. Peaches, grapes, and orchard fruits are abundant. Grape culture is highly successful around Pittsburgh. —The climate of Pennsylvania is hot in summer in the south and east, and very cold on the Alleghany, central, and northern uplands, where snow 6 ft. deep has been known to lie throughout the winter. The summer heat is prolonged in S. E. Pennsylvania far into the autumn. On the highlands no month passes without frost, and the temperature sometimes sinks to 25° below zero. Along the Delaware, from the middle of June to the middle of September, the temperature often ranges between 90° and 100°. The wide deep gorges of the Susquehanna and its branches have a climate which might make them continuous lines of vineyard, rivalling those of the Rhine and the Rhône. The average fall of rain and snow varies in different parts of the state from 36 to 45 inches. The climate is highly favorable to health. The malarious fevers of the principal river valleys are much less dreaded than those of the Mississippi valley. Vegetation is about a week earlier than in New York. —Pennsylvania holds a high rank as an agricultural state. According to the federal census of 1870, it ranked after Illinois, New York, and Ohio in the extent of improved land in farms and the total value of all farm productions, next to New York and Ohio in the cash value of farms, and next to New York in the value of farming implements and machinery. The total number of farms was 174,041, and the average size 103 acres. There were 10,028 containing from 3 to 10 acres, 15,905 from 10 to 20, 48,151 from 20 to 50, 61,268 from 50 to 100, 38,273 from 100 to 500, 76 from 500 to 1,000, and 76 having over 1,000 acres. There were 11,515,965 acres of improved land in farms, 5,740,864 woodland, and 737,371 other unimproved land. The cash value of farms was $1,043,481,582; of farming implements and machinery, $35,658,196; total amount of wages paid during the year, including value of board, $23,181,944; total estimated value of all farm productions, including betterments and additions to stock, $183,946,027; orchard products, $4,208,094; produce of market gardens, $1,810,016; of forests, $2,670,370; value of home manufactures, $1,503,754; of animals slaughtered or sold for slaughter, $28,412,903. The chief agricultural productions, with the number of live stock, and the relative rank of this with other states, were as follows:

ARTICLES.	Quantities produced.	Relative rank.
Wheat, bush.	19,672,967	6
Rye, bush	3,577,641	1
Indian corn, bush.	34,702,006	8
Oats, bush.	36,478,585	2
Barley, bush.	529,562	9
Buckwheat, bush	2,532,173	2
Peas and beans, bush.	39,574	23
Potatoes, bush.	12,889,367	2
Clover seed, bush	200,679	1
Flax seed, bush	15,624	8
Grass seed, bush	50,643	5
Tobacco, lbs	3,467,539	12
Wool, lbs	6,561,722	5
Butter, lbs.	60,834,644	2
Cheese, farm, lbs.	1.145,209	9
" factory, lbs	1,647.467	8
Hops, lbs	90,683	12
Flax, lbs.	815,906	4
Maple sugar, lbs.	1,545,917	6
Honey, lbs.	796,989	6
Beeswax, lbs.	27,083	7
Hay, tons	2,849,219	2
Hemp, tons.	571	4
Wine, galls	97,165	5
Milk sold, galls	14,411,729	4
Molasses, sorghum, galls	213,373	14
" maple, galls	39,385	5
Horses on farms	460,339	6
" not on farms	151,149	4
Mules and asses.	18,009	16
Milch cows	706,437	2
Working oxen	30,048	19
Other cattle	608,066	3
Neat cattle not on farms.	161,846	5
Sheep	1,794,301	5
Swine	867,548	11
Value of live stock on farms	$115,647,075	4

The agricultural productions in 1873 have been reported by the national department of agriculture as follows:

ARTICLES.	Quantities produced.	No. of acres in each crop.	Average yield per acre.	Total value.
Indian corn, bu.	36,929,000	1,052,108	35·1	$22,157,400
Wheat, bush	15,548,000	1,094,929	14·2	23,322,000
Rye, bush	3,283,000	226,414	14·5	2,659,230
Oats, bush	31,229,000	1,034,078	30·2	18,428,470
Barley, bush	898,000	19,220	20·6	417,900
Buckwheat, bu.	2,022,000	103,692	19·5	1,698,480
Potatoes, bush.	10,602,000	110,437	96	6,891,300
Tobacco, lbs	15,000,000	12,640	1,186	1,845,000
Hay, tons	2,446,400	2,127,804	1·15	48,545,920
Total	....	5,780,917	....	$115,963,700

The number and value of farm animals in January, 1874, were reported as follows by the same authority:

ANIMALS.	Number.	Value.
Horses	557,000	$55,882,510
Mules	24,900	3,164,293
Oxen and other cattle	722,600	19,141,674
Milch cows	812,600	27,018,950
Sheep	1,674,000	5,856,300
Hogs	1,034,400	6,847,723

As a dairy state Pennsylvania ranked, according to the census of 1870, next to New York in the number of milch cows and the quantity of butter produced; but in the quantity of milk sold it came after New York, Ohio, and Michigan, and it ranked tenth in the production of farm and eighth in factory cheese. The most important dairy counties were Berks, Bradford, Bucks, Chester, Crawford, Erie, Lancaster, Montgomery, Susquehanna, and York, in all of which the number of milch cows ranged from 20,000 to 35,000, and the amount of butter produced from 1,500,000 to 3,700,000 lbs.—According to the census of 1870, the mineral products of Pennsylvania were valued at nearly half of those of the entire United States. The extent of the mining industry was as follows:

MINERALS.	Number of establishments.	Hands employed.	Capital invested.	Value of products.
Coal, anthracite	229	53,021	$50,936,785	$38,436,745
" bituminous	359	16,851	16,974,918	18,921,069
Copper	2	7	30,500	7,800
Iron ore	186	4,886	4,548,026	3,944,146
Marble	6	86	226,000	101,000
Nickel	1	48	60,000	24,000
Petroleum	2,148	4,070	9,249,283	13,045,967
Slate	28	732	1,502,339	618,229
Stone	126	1,114	732,425	873,879
Zinc	1	400	400,000	235,555
Total	3,086	81,215	$84,660,276	$76,208,390

The amount of anthracite coal produced was 15,650,275 tons, and of bituminous coal 7,798,518 tons; iron ore, 1,095,486 tons; petroleum, 171,207,622 gallons. The most extensive and valuable coal mines in America are in Pennsylvania. The coal fields cover an area of 12,774 sq. m., including the anthracite basin of 470 sq. m. in eastern Pennsylvania. Of the 66 counties of the state, 24 in the S. E. part and Erie in the N. W. contain no coal. The anthracite beds are chiefly in Dauphin, Schuylkill, Carbon, and Luzerne cos., and extend into Northumberland and Columbia cos.; semi-anthracite coal is found in Dauphin, Sullivan, and Wyoming cos. Bradford, Lycoming, Tioga, Huntingdon, Bedford, and Fulton contain detached fields of semi-bituminous coal. Forty-one counties in the north and northwest produce bituminous coal. In Mercer co. on the W. border are deposits of the most valuable coal in the United States. It is a species of semi-cannel coal, with a slaty structure and a dull, jet-black lustre, with a thickness of from 3 to 4 ft. It is known as block coal, and is specially adapted to the smelting of iron. The annual production is about 500,000 tons. (See Anthracite, Coal, and Colliery.) The number of anthracite collieries in 1875 was 437; shafts, 91; slopes, 293; drifts and tunnels, 290. The amount of anthracite coal annually mined in Pennsylvania down to 1871 is given under Anthracite; the production since that date has been as follows:

DISTRICTS.	1872.	1873.	1874.
	Tons.	Tons.	Tons.
Schuylkill	5,010,908	5,182,043	4,844,922
Northumberland	1,891,827	1,404,070	1,874,245
Columbia	844,220	888,741	290,923
Lykens Valley	480,828	479,915	478,481
Wyoming	10,694,808	11,722,241	10,385,804
Lehigh	4,110,674	3,706,108	3,641,873
Total	22,032,265	22,828,178	21,516,248

Of this product, 18,932,265 tons were sent to market in 1872, 19,585,178 in 1873, and 18,537,888 in 1874, the remainder in each year being the estimated home consumption. The production of bituminous coal was 4,741,867 tons in 1872 and 5,059,769 in 1873. The entire production of coal in 1874 was 32,147,040 tons, including 21,631,118 of anthracite, 7,712,461 of bituminous, 2,303,461 of semi-bituminous, and 500,000 of block. Nearly half of the pig iron made in the United States is produced in Pennsylvania. The extent of this industry in this state and the United States is as follows:

PARTICULARS.	Pennsylvania.	United States.
Number of stacks in 1872	248	612
" of tons (2,000 lbs.) produced in 1872	1,401,497	2,854,558
Number of stacks in 1873	262	662
" of tons produced in 1873	1,389,573	2,868,278
" of stacks in blast Jan. 1, 1874	166	410
Whole number of stacks, July 1, 1874	268	678

Of the product of Pennsylvania in 1873, 918,085 tons were produced in anthracite, 430,634 in bituminous coal and coke, and 45,854 in charcoal furnaces.—The manufacturing interests of Pennsylvania are of the highest importance. According to the census of 1870, the amount of capital invested in manufactures, and the number of establishments, were larger in Pennsylvania than in any other state, while the value of products was greater than in any other except New York. The following table of the leading industries makes a comparison between the values in Pennsylvania and in the United States of those products in which the former ranks above all other states:

INDUSTRIES.	No. of establishments.	Hands employed.	Capital.	Wages.	Value of materials.	Value of products.	
						Pennsylvania.	United States.
Agricultural implements	286	2,286	$3,887,949	$1,025,618	$1,278,805	$3,652,295	....
Blacksmithing	3,520	6,990	2,219,735	1,199,047	1,775,502	5,898,589	41,828,296
Bleaching and dyeing	79	799	1,212,800	352,887	6,087,864	7,285,114	....
Bookbinding	91	1,877	1,640,807	674,254	1,919,981	3,588,623	....
Boots and shoes	3,947	15,799	6,875,943	4,818,902	6,982,726	16,864,810	....
Brass founding and finishing	63	826	2,118,985	895,780	1,100,167	2,080,055	6,855,756

INDUSTRIES.	No. of establishments.	Hands employed.	Capital.	Wages.	Value of materials.	Value of products.	
						Pennsylvania.	United States.
Bread, crackers, and other bakery products	809	2,494	1,920,290	783,411	3,195,678	5,597,291	....
Brick	458	7,448	4,559,788	2,337,691	1,530,527	6,071,209	29,028,859
Carpentering and building	1,846	10,588	7,671,851	5,335,181	18,772,286	27,336,490	132,901,432
Carriages and wagons	1,449	6,252	4,322,517	2,229,441	2,111,361	6,682,302	....
Cars, freight and passenger	49	4,076	3,763,804	2,193,857	5,832,736	9,288,041	31,070,734
Clothing, men's	1,364	17,978	9,709,059	4,758,807	12,036,899	21,850,319	....
Coal oil, rectified	89	957	4,006,433	688,583	12,345,899	15,251,223	26,942,287
Confectionery	268	1,187	1,180,905	390,585	1,195,851	2,491,382	....
Cooperage	474	2,256	1,084,335	945,487	1,502,537	3,209,470	....
Cotton goods, not specified	121	12,281	11,940,141	3,386,248	10,021,161	16,626,101	....
" " batting and wadding	10	39	82,000	9,348	42,153	61,562	....
" " thread, twine, and yarn	12	442	603,680	114,988	686,158	877,365	....
Drugs and chemicals	82	1,812	6,060,300	826,637	5,346,834	8,451,991	19,417,194
Fertilizers	33	414	1,507,500	216,626	900,975	1,635,200	5,815,118
Flouring and grist-mill products	2,985	6,427	20,393,620	1,278,146	41,763,255	49,476,245	....
Furniture	948	5,684	5,005,058	2,430,868	2,826,060	8,082,530	....
Glass, cut	2	10	1,100	3,500	5,080	13,000	....
" stained	4	58	28,500	33,128	34,100	108,280	297,480
" ware	42	5,590	5,843,816	3,095,597	2,016,705	7,407,135	14,800,949
" window	10	645	598,000	412,345	315,293	894,190	....
Gunpowder	15	184	752,900	77,045	558,546	873,033	4,011,339
Hats and caps	81	1,650	1,085,668	708,088	1,248,231	2,813,766	....
Heating apparatus	27	842	511,580	252,120	413,487	1,197,660	3,425,150
Hosiery	76	4,899	2,979,000	1,280,270	2,925,323	5,306,738	....
Iron and manufactures of iron	892	47,134	78,768,802	24,680,094	80,657,261	122,605,296	322,128,698
" blooms	48	1,478	2,446,600	707,589	3,683,300	4,881,431	7,647,054
" forged and rolled	185	21,865	28,256,390	12,243,488	39,581,157	57,976,471	128,062,627
" anchors and cable chains	4	48	87,380	18,500	115,000	160,400	684,200
" bolts, nuts, washers, and rivets	29	1,558	1,792,200	805,323	1,700,315	3,112,307	7,191,151
" nails and spikes, cut and wrought	31	2,036	2,672,950	1,106,214	5,233,881	6,783,699	24,823,996
" pipe, wrought	8	1,288	4,209,000	709,710	2,934,908	4,552,394	7,369,194
" railing	12	55	29,100	18,176	15,652	55,588	....
" ship building and marine engines	1	352	750,000	210,000	187,000	472,000	....
" pigs	186	10,861	26,376,059	5,014,455	22,638,492	32,686,410	69,640,498
" castings, not specified	443	7,587	10,959,878	8,813,087	8,378,518	15,089,415	....
" " stoves, heaters, and hollow ware	81	2,052	3,912,200	1,139,751	1,427,929	3,668,880	....
Leather, tanned	890	4,650	11,800,046	1,683,479	13,994,086	19,828,823	....
" curried	558	1,080	1,830,461	298,981	4,479,454	5,429,833	....
" morocco, tanned and curried	25	1,002	1,342,778	589,372	2,051,813	3,225,041	9,997,460
" dressed skins	22	148	344,500	65,867	267,777	416,299	....
Lime	403	1,821	993,257	448,158	989,531	2,058,675	8,917,405
Liquors, distilled	108	512	2,504,857	215,837	1,950,077	4,618,228	....
" malt	246	1,583	6,966,236	773,267	3,553,986	7,056,400	....
Lumber, planed	183	1,859	2,998,406	958,817	4,082,125	6,323,605	....
" sawed	3,738	17,424	24,792,304	5,260,076	14,935,096	28,930,985	....
Machinery, not specified	276	6,774	9,405,012	3,656,044	5,086,018	11,664,421	54,429,634
" cotton and woollen	27	857	1,584,300	895,301	507,202	1,437,949	....
" railroad repairing	23	5,878	9,235,695	3,295,641	3,693,691	7,233,882	27,565,650
" steam engines and boilers	151	4,686	5,848,118	2,597,144	4,246,282	8,922,401	41,576,264
Marble and stone work, not specified	150	1,950	2,345,365	1,095,722	1,586,562	3,799,995	....
" " " monuments and tombstones	158	716	725,545	282,017	438,472	1,043,307	....
Meat, cured and packed, not specified	10	127	1,320,000	81,560	2,109,400	2,956,002	....
" " " pork	18	195	1,548,000	112,550	2,895,190	3,854,900	....
Molasses and sugar, refined	15	1,241	5,619,000	663,408	24,417,982	26,731,016	....
Paints, lead and zinc	23	561	2,177,250	261,022	2,304,004	3,776,360	11,211,647
Paper, printing	29	1,178	3,165,720	451,899	2,368,082	3,825,008	....
Patent medicines and compounds	61	444	1,682,984	176,879	3,085,746	6,344,796	16,257,720
Printing, cotton and woollen goods	7	868	1,695,000	353,390	4,958,960	6,113,584	....
Printing and publishing, not specified	77	3,117	7,704,500	2,054,975	3,866,887	10,108,951	....
Saddlery and harness	908	2,488	1,589,958	662,347	1,400,505	3,051,771	....
Sash, doors, and blinds	204	2,732	3,514,410	1,437,546	2,971,930	5,911,671	....
Saws	11	682	980,500	460,479	534,782	1,235,184	3,175,239
Ship building, repairing, and ship materials	106	2,174	1,556,492	1,065,265	1,298,401	3,083,244	....
Soap and candles	96	748	1,821,200	301,344	1,762,376	3,149,481	....
Steel, Bessemer	2	217	558,000	104,000	1,080,000	1,405,000	....
" cast	14	1,549	3,804,400	1,036,632	2,755,918	5,359,038	6,936,566
" forged	2	47	208,000	60,300	121,018	201,200	201,200
" springs	10	198	1,226,000	122,202	566,023	990,763	2,926,998
Stone and earthen ware	198	1,374	1,477,240	448,815	584,808	1,659,747	6,045,536
Tin, copper, and sheet-iron ware	974	3,681	3,202,477	1,206,277	2,423,749	5,311,810	40,686,811
Tobacco, cigars	975	5,775	1,966,895	1,460,359	1,982,445	5,276,628	....
Umbrellas and canes	27	1,355	1,016,682	343,260	1,051,926	2,049,798	4,696,082
Wood, turned and carved	158	955	558,748	337,772	320,669	1,105,470	4,959,191
Woollen goods	408	12,578	14,066,785	4,340,066	17,325,849	27,361,897	....
Worsted goods	31	3,868	3,350,078	1,868,334	4,932,940	7,883,038	....

Among less important industries in which the products of Pennsylvania were valued at more than those of any other state were paper bags, ground bark, blacking, rag carpets, carriage trimmings, charcoal and coke, chromos and lithographs, dye woods, stuffs, and extracts, explosives and fire works, glue, perfumery, cosmetics, and fancy soaps. In the aggregate value of building materials and roofing materials produced the state also ranked first. Large quantities of lumber, chiefly pine, are cut in the northern central part of the state. The leading lumber markets of the state are Williamsport and Lock Haven on the W. branch of the Susquehanna. The shipments of lumber from these two points during the first half of 1873 amounted to 159,884,029 ft. On Jan. 1, 1874, the estimated amount of lumber at Williamsport comprised 220,961,922 ft. of pine and 19,872,444 of hemlock, besides large quantities of lath and pickets.—Pennsylvania has two United States ports of entry, Philadelphia and Erie. The extent of the commerce at these ports is indicated in the articles on those cities. Pittsburgh is a port of delivery in the district of Louisiana.—The vast mineral wealth of Pennsylvania has led to the development of a system of internal improvements not excelled by those of any other state. In 1826 the state began the construction of a line of communication between Philadelphia and Pittsburgh, consisting of about 292 m. of canal and 126 m. of railroad. This line was completed in 1831, at a cost of $18,615,663; this liability was increased, in consequence of other works undertaken and aided by the state, to $41,294,462. After great losses had been sustained, the state about 1857 disposed of its entire interest and control in these works, and in that year an amendment was made to the constitution prohibiting the state from constructing or being a stockholder in any canal or railroad. The constitution, as amended in 1873, prohibits railroads and canals from making unjust discriminations in charges for freight or passengers, or in facilities for transportation; railroad companies are prohibited from granting free passes, or passes at a discount, to any persons except officers or employees of the company. The secretary of internal affairs has a general supervision over railroads, canals, and other transportation companies. The two most extensive railroad corporations of the state are the Philadelphia and Reading and the Pennsylvania. The former, chartered in 1833, was opened for through trains between Philadelphia and Pottsville in 1842. This company now operates from 15 to 20 main lines and branches, comprising more than 700 m. of railroad; also the Schuylkill and Susquehanna canals. The investments of the company in railroads, work shops, coal mines, and iron works are estimated at about $125,000,000. The chief business of the company is the transportation of coal from the southern anthracite coal fields to tide water in the Delaware river near Philadelphia. About 7,000,000 tons of coal are annually transported over the roads of this company. The Pennsylvania is perhaps the most powerful railroad corporation in America; nearly 2,500 m. of railroad in Pennsylvania are operated by it, and its investments in this state are estimated at not less than $150,000,000; besides which it owns or leases a large extent of road outside of the state. At the beginning of 1874 the mileage of railroads in Pennsylvania was reported by the auditor general at 5,854 m., including 4,257 m. of main track and 1,597 of branches. There were also 2,218 m. of sidings and 1,819 of double track. The entire length of main line reported by Pennsylvania companies was 8,401 m. of which 6,655 m. were laid. The capital stock authorized by law was $515,368,954; subscribed, $389,874,234; paid in, $478,711,878; funded debt, $378,590,370; floating debt, $37,601,157; cost of road and equipment, $621,812,048. The total expenses of all of these roads amounted to $95,207,139, including $48,818,074 for operating the roads; the total receipts were $147,995,214, of which $28,350,040 was from passengers and $107,533,075 from freight. The railroad system of the state at the beginning of 1874 was as follows:

RAILROADS OWNED, LEASED, OR OPERATED BY THE PHILADELPHIA AND READING RAILROAD COMPANY.

NAME.	TERMINI.		Miles in operation in Pennsylvania.	Length between termini when different from preceding.	Cost of road and equipment.	Capital stock paid in.
	From	To				
Allentown	Port Clinton	Allentown	5	36	$1,078,438	$568,744
Catawissa	Tamanend	Williamsport	94	..	6,126,500	1,740,350
Chester Valley	Bridgeport	Downingtown	21	..	1,371,000	871,900
Chestnut Hill	Germantown	Chestnut Hill	4	..	120,650	120,650
Colebrookdale	Pottstown	Housensack	12	18	667,126	47,165
East Mahanoy	East Mahanoy Junc.	Waste House Run	7	..	892,550	892,550
East Pennsylvania	Reading	Allentown	36	..	1,484,290	1,309,200
Little Schuylkill Navigation and Coal Company	Catawissa Railroad Junction	Port Clinton	28	..	1,416,187	2,646,100
Mine Hill and Schuylkill Haven	Schuylkill Haven	Locust Gap Fremont	42	..	3,992,050	3,992,050
Perkiomen	Perkiomen Junc'n.	Emans	24	36	1,388,700	38,040
Philadelphia and Reading	Philadelphia	Pottsville	93	..	45,319,348	34,270,575
Branches: Lebanon and Fremont	....	....	42	..	....	....
Branches: Lebanon Valley	....	....	54	..	....	....
Branches: Mahanoy and Shamokin	....	....	65	..	....	....
Branches: Mount Carbon	....	....	3	..	....	....
Branches: Schuylkill and Susq'hanna	....	....	58	..	....	....
Philadelphia, Germantown, and Norristown	Philadelphia	Norristown	20	..	1,514,800	2,231,900
Plymouth branch	Conshohocken	Oreland	9	..	274,495	12,500
Pickering Valley	Phœnixville	Byers	11	..	474,551	92,875
Reading and Columbia	Columbia	Sinking Spring	40	..	2,292,999	508,268
Lancaster branch	....	....	8	..	....	....
Lebanon branch	....	....	8	..	....	....
Schuylkill Valley	Port Carbon	Reevesdale	11	..	576,340	576,050

RAILROADS LYING WHOLLY OR PARTLY WITHIN PENNSYLVANIA, OWNED, LEASED, OR OPERATED BY THE PENNSYLVANIA RAILROAD COMPANY.

NAME.	TERMINI.		Miles in operation in Pennsylvania.	Length between termini when different from the preceding.	Cost of road and equipment.	Capital stock paid in.
	From	To				
Alleghany Valley	Pittsburgh	Oil City	132	....	$12,382,817	$2,256,400
Bald Eagle Valley	Lock Haven	Near Tyrone	51	....	1,050,000	550,000
Bedford and Bridgeport	Mount Dallas	State line	39	....	1,412,182	856,952
Dunning's Creek branch	....	Holderbaum	10	....	....	....
Bellefonte and Snow Shoe	Bald Eagle Valley railroad	Snow Shoe	21	....	458,181	600,000
Buffalo, Corry, and Pittsburgh	Brocton, N. Y.	Corry	6	43	14,999	....
Cleveland and Pittsburgh	Cleveland, O.	Rochester	15	124	15,571,299	11,230,500
Connecting	Pennsylvania railr'd.	Philadelphia and Trenton railroad.	7	....	2,278,300	1,278,300
Cumberland Valley	Harrisburg	Potomac river	68	82	1,758,618	1,774,612
Leased: Southern Pennsylvania	South Penn. Junc.	Richmond	21	....	978,750	800,000
Leased: Dillsburg and Mechanicsb'g.	Dillsburg	Mechanicsburg	8	....	170,056	80,808
Danville, Hazleton, and Wilkesbarre	Sunbury	Tomhicken	45	....	1,102,600	684,285
East Brandywine and Waynesburg	Downington	New Holland	17	27	360,851	183,851
Ebensburg and Cresson	Ebensburg	Cresson	11	....	122,000	42,000
Erie and Pittsburgh	New Castle	Girard	81	....	4,989,844	1,099,550
Harrisburg, Portsmouth, Mt. Joy, and Lancaster	Lancaster	Harrisburg	36	....	1,882,550	1,182,550
Lawrence	Lawrence Junction.	Youngstown, O.	8	18	715,937	360,200
Lewisburg, Centre, and Spruce Creek	Lewisburg Junction	Tyrone	19	87	1,256,545	245,686
Mifflin and Centre County	Lewistown Junct'n.	Milroy	12	....	265,075	65,675
Northern Central	Baltimore	Sunbury	138	....	15,429,888	5,842,000
Leased: Elmira and Williamsport	Erie Junction, N. Y.	Williamsport	70	76	2,620,000	1,000,000
Leased: Shamokin Valley and Pottsville	Sunbury	Mt. Carmel	28	....	1,208,050	869,450
Oil Creek and Alleghany River	Corry	Irvineton	95	....	9,628,963	4,959,450
Branch	Union	Titusville	25	....	....	....
Pennsylvania	Philadelphia	Pittsburgh	355	....	48,279,666	68,144,475
	Altoona	Hollidaysburg	8	....	....	....
	Blairsville Junction.	Indiana	19	....	....	....
	Columbia	York	14	....	....	....
	Hollidaysburg br'ch.	Morrison's Cove	20	....	....	....
	Williamsburg	Hollidaysburg	14	....	....	....
Pennsylvania and Delaware	Pomeroy	Delaware City, Del.	22	41	2,502,000	900,000
Philadelphia and Erie	Erie	Sunbury	288	....	28,644,262	8,448,700
Philadelphia and Trenton	Kensington	Morrisville	26	....	1,584,478	1,259,100
Philadelphia, Wilmington, and Baltimore	Philadelphia	Baltimore, Md	18	95	11,814,765	11,507,750
Pittsburgh, Cincinnati, and St. Louis	Pittsburgh	Columbus, O.	35	193	19,682,844	8,488,750
Leased: Chartiers	Mansfield	Washington	23	....	1,128,690	644,100
Pittsburgh, Fort Wayne, and Chicago	Pittsburgh	Chicago, Ill.	49	468	28,412,858	23,814,285
Leased: Lawrence	Lawrence Junction.	Youngstown, O.	8	18	715,937	360,200
Leased: Newcastle and Beaver Valley	Homewood	New Castle	15	....	810,480	605,000
Pittsburgh, Virginia, and Charleston	Pittsburgh	Monongahela City	30	....	1,148,898	678,264
Shamokin Valley and Pottsville	Sunbury	Mt. Carmel	28	....	1,208,050	869,450
South Mountain Iron company	Carlisle	Pine Grove furnace.	18	....	888,480	....
Southwest Pennsylvania	Greensburg	Connellsville	24	....	968,887	850,857
Stony Creek	Norristown	Lansdale	10	....	455,445	140,560
Summit Branch	Millersburg	Williamstown	20	....	988,902	2,502,950
Sunbury and Lewistown	Lewistown	Selinsgrove	43	....	1,900,000	500,000
Tyrone and Clearfield	Tyrone	Clearfield	40	....	828,566	510,000
Western Pennsylvania	Blairsville	Butler	57	....	3,950,872	1,022,450
Pittsburgh branch	Freeport	Allegheny	27	....	....	....

RAILROADS NOT CONTROLLED BY THE PHILADELPHIA AND READING OR THE PENNSYLVANIA RAILROAD COMPANY.

NAME.	From	To	Miles in operation in Pennsylvania.	Length between termini when different from the preceding.	Cost of road and equipment.	Capital stock paid in.
Atlantic and Great Western	Salamanca, N. Y.	Dayton, O.	92	387	....	39,458,700
Bachman Valley	Valley Junction	State line	9	....	108,277	66,604
Barclay	Barclay	Towanda	16	....	....	1,000,000
Bell's Gap	Bell's Mills	Lloyd's	9	....	212,868	184,000
Berks County	Reading	Slatington	5	44	....	189,790
Buffalo, New York, and Philadelphia	Buffalo, N. Y.	Emporium	43	121	5,405,935	1,615,000
Catasauqua and Fogelsville	Catasauqua	Rittenhouse Gap	20	....	742,156	426,900
Corning, Cowanesque, and Antrim	Corning, N. Y.	Antrim	37	53	1,600,000	1,600,000
Cornwall	Cornwall	Union canal	7	....	421,492	300,000
Delaware and Hudson Canal	Scranton	Honesdale	45	....	4,576,125	....
Delaware, Lackawanna, and Western	Great Bend	Delaware river	115	....	21,221,854	23,500,000
Bloomsburg division	Scranton	Northumberland	80	....	....	....
Dunkirk, Alleghany Valley, and Pittsburgh	Dunkirk, N. Y.	Oil City	43	106	4,500,000	1,300,000
East Broad Top	Mount Union	Robertsdale	12	30	$564,618	400,250
Erie	Jersey City, N. J.	Dunkirk, N. Y.	42	459	111,680,092	86,586,910
Leased: Buffalo, Bradford, and Pittsburgh	Carrollton, N. Y.	Gilesville	18	26	2,869,000	2,286,000
Leased: Jefferson	Susquehanna	Carbondale	38	....	4,895,700	2,095,700
	Hawley	Honesdale	9	....	....	....
Hanover Branch	Hanover	Hanover Junction	12	....	288,851	116,850
Harrisburg and Potomac	Harrisburg	Waynesboro	7	60	269,250	118,890
Branch	Main line	Littlestown	30	....	....	....
Ironton	Coplay	Ironton and Orefield	11	....	268,000	400,000

NAME.	TERMINI.		Miles in operation in the state.	Length between termini when different from the preceding.	Cost of road and equipment.	Capital stock paid in.
	From	To				
Lake Shore and Michigan Southern	Buffalo, N. Y	Chicago, Ill	44	569	$75,949,742	$50,000,000
Leased: Jamestown and Franklin	Jamestown	Oil City	51	....	2,501,697	605,027
Lehigh and Susquehanna	Phillipsburg, N. J	Union Junction	105	....	12,754,895	....
Nanticoke branch	....	....	20	....	....	....
Nescopeo "	....	....	9	....	....	....
Leased { Lehigh and Lackawanna	Bethlehem	Stroudsburg	15	36	675,100	375,100
Nesquehoning Valley	Mauch Chunk	Tamanend	16	....	1,265,684	1,300,000
Tresckow	Silver Brook	Audenried	6	....	208,780	180,000
Lehigh Valley	Phillipsburg, N. J	Wilkesbarre	101	....	20,489,162	21,916,850
Branches {	Penn Haven Junc	Audenried	18	....	....	....
	Penn Haven	Tomhicken	35	....	....	....
	Lumber Yard	Milnsville	17	....	....	....
	Black Creek Junc	Mount Carmel	58	....	....	....
Littlestown	Hanover	Maryland state line	9	....	115,616	84,850
Montrose (narrow gauge)	Montrose	Tunkhannock	25	28	321,100	248,851
Mount Alto	Cumberland Valley railroad Junction	Mount Alto	10	....	235,000	110,000
Muncy Creek	Hall's Station	Bernice	6	40	150,900	123,600
Newcastle and Franklin	New Castle	Jamestown and Franklin railroad	23	36	551,969	302,427
North Pennsylvania	Philadelphia	Bethlehem	56	....	8,459,576	8,596,500
Branch	Lansdale	Doylestown	10	....	....	....
Operated: Northeast Pennsylvania	Abington	Bonair	7	....	228,881	81,550
Peach Bottom	York	Oxford	8	60	223,588	188,764
Pennsylvania coal	Hawley	Port Griffith	47	....	2,000,000	4,000,000
Branch (leased to Erie)	Hawley	Lackawaxen, N. Y	16	....	....	....
Pennsylvania and New York	Wilkesbarre	Waverley, N. Y	104	....	6,142,827	4,061,700
Operated: Sullivan and Erie	Monroeton	Bernice	24	....	1,597,718	1,500,000
Pennsylvania Inland	Hancock	Carbondale	35	....	....	....
Philadelphia and Baltimore Central	West Chester Junc	Columbia and Port Deposit R. R., Md	37	46	1,988,850	290,606
Branch, Chester Creek	Lenni	Lamoken	7	....	....	....
Pit-Hole Valley	Pit-Hole City	Oleopolis	7	....	101,764	250,000
Pittsburgh and Castle Shannon	Pittsburgh	Finleyville	6	16	454,426	446,920
Pittsburgh, Washington, and Baltimore	Pittsburgh	Cumberland, Md	142	149	12,644,274	1,960,682
Fayette County	Connellsville	Uniontown	18	....	....	....
Mount Pleasant and Broad Ford	Broad Ford	Mount Pleasant	9	....	....	....
Shenango and Allegheny	Shenango	Harrisville	31	....	1,178,102	199,000
Somerset and Mineral Point	Somerset	Mineral Point	9	....	140,000	55,900
Susquehanna, Gettysburg, and Potomac	Gettysburg	Potomac river, Md	17	100	181,000	1,500,000
Tioga	N. Y. state line	Morris Run	31	....	1,354,801	580,900
West Chester and Philadelphia	West Chester	Philadelphia	26	....	1,694,932	828,950
Leased: West Chester	West Chester	Junc. Penn. railro'd	9	....	205,486	165,000
Wheeling, Pittsburgh, and Baltimore	Wheeling, W. Va	Washington	18	32	....	500,000
Wilmington and Reading	Wilmington, Del	Birdsboro	52	64	3,329,089	759,627
Wilmington and Western	Wilmington, Del	Oxford	20	36	796,516	248,807

The canals lying wholly or partly in Pennsylvania are 880 m. in length, of which 781 m. are within the state. The total cost of the canals and fixtures has been $36,589,879, exclusive of the Pennsylvania. The receipts in 1873 were $2,842,918, and the total expenses were $1,824,915. The canals are used chiefly for the transportation of coal. Their situation and cost are shown in the following statement:

NAME.	TERMINI.		Miles in Pennsylvania.	Total length between termini when different from the preceding.	Cost of canal and fixtures.
	From	To			
Delaware and Hudson	Honesdale	Eddyville, N. Y	25	108	$6,339,210
Lehigh Coal and Navigation	Easton	Coal Port	48	....	8,000,000
Leased: Delaware Division	Easton	Bristol	60	....	2,438,350
Monongahela Navigation	Pittsburgh	New Geneva	85	....	1,151,904
Muncy	Pennsylvania	Muncy basin	½	....	6,846
Pennsylvania {	Columbia	Wilkesbarre	151 } 356*	....	Unknown.
	Junction	Williamsburg	118	....	....
	Northumberland	Farrandsville	71	....	....
	Clark's Ferry	Millersburg	12	....	....
Schuylkill	Mill Creek	Philadelphia	108	....	12,908,247
Susquehanna	Columbia	Havre de Grace, Md	30	45	4,797,471
Union	Middletown	Reading	78	....	5,907,850

—The number of national banks in operation on Nov. 1, 1874, was 205 (of which 29 were in Philadelphia and 16 in Pittsburgh), having a paid-in capital of $53,910,240 and an outstanding circulation of $42,092,711, being $11 95 per capita, 1·1 per cent. of the wealth of the state, and 78·1 per cent. of the bank capital. There were 115 state and savings banks which reported resources aggregating $85,732,021; capital stock actually paid in, $8,370,169; deposits, $20,961,262; aggregate liabilities, $35,732,021. In 1873 Pennsylvania paid $15,601,717 for fire and marine insurance, and $8,016,236 for life insurance. A bureau of insurance was established by the legislature in 1872; an annual report concerning the insurance companies doing business in the state is made to the legislature by the commissioner of insurance.—Under the amended constitution of 1873, which went into force on Jan. 1, 1874, the general assembly consists of 50 senators elected for four years, and 200 representatives chosen for two years. Regular sessions are held biennially, beginning on the first Tuesday of January in odd years. Extra sessions may be convened by the governor, but annual adjourned sessions are prohibited after 1878. In case of a vacancy in the office of United States senator from this state when the legislature is not in session, the governor is required to convene that body on notice not exceeding 60 days. Members of the legislature receive $1,000 for each regular session not exceeding 100 days, and $10 a day for time, not exceeding 50 days at any session, necessarily spent after the hundred days; also 20 cents a mile for going to and from the capital. There are strict constitutional limitations on special legislation. The executive department consists of a governor, who receives a salary of $10,000; lieutenant governor, who acts as president of the senate, $3,000; secretary of the commonwealth, $4,000; attorney general, $3,500; auditor general, $3,000; state treasurer, $5,000; secretary of internal affairs, $3,000; and superintendent of public instruction, $2,500. The governor, lieutenant governor, and secretary of internal affairs are elected by the people for four years, the auditor general for three, and the treasurer for two years. The attorney general, secretary of the commonwealth, and superintendent are appointed for four years by the governor, with the consent of two thirds of the senators. The governor is ineligible to the office for the next succeeding term; he may grant commutations of sentence and pardons only upon the written recommendation of the lieutenant governor, secretary of the commonwealth, attorney general, and secretary of internal affairs, or any three of them, after full hearing upon due public notice and in open session. In addition to the ordinary veto powers, he may exercise a partial veto on appropriation bills. The secretary of the commonwealth keeps a record of all official acts and proceedings of the governor. The secretary of internal affairs succeeds to the duties of the surveyor general, which title is now abolished. His department embraces a bureau of industrial statistics, and he is in addition required to discharge such duties relating to corporations, and to the charitable institutions, the agricultural, manufacturing, mining, mineral, timber, and other material or business interests of the state, as may be prescribed by law. He must report annually to the general assembly. The judicial power is vested in a supreme court, courts of common pleas, of oyer and terminer and general jail delivery, of quarter sessions of the peace, orphans' courts, and magistrates' courts. The supreme court consists of seven judges, who are elected by the people for 21 years, but are not eligible for reëlection, and receive an annual salary of $7,000 each. The judge having the shortest term to serve becomes chief justice. This court has original jurisdiction only in cases of injunction where a corporation is a party defendant, of habeas corpus, of mandamus to courts of inferior jurisdiction, and of quo warranto as to all officers of the commonwealth whose jurisdiction extends over the state. Annual sessions of the supreme court are held in Philadelphia, Harrisburg, Sunbury, and Pittsburgh. The judges of the supreme court, as well as those of the common pleas, are justices of oyer and terminer and general jail delivery in the several counties. The state is divided into 43 judicial districts, in each of which one or more common pleas judges are elected for ten years. Judges of the courts of common pleas are also judges of the courts of oyer and terminer, of quarter sessions of the peace, of general jail delivery, and of orphans' courts where separate tribunals of this kind have not been established. They also act as justices of the peace in criminal matters in their respective districts. There are special courts in Philadelphia and Pittsburgh, which are described in the articles on those cities. The state is divided into two districts for holding United States courts. In the eastern district, courts are held in Philadelphia; in the western, in Pittsburgh, Williamsport, and Erie. The right of voting is given to every male citizen, not under 21 years of age, who has been a citizen of the United States at least one month, and a resident of the state one year and of the election district two months next preceding the election; if 22 years of age or upward, he must have paid within two years a state or county tax assessed at least two months and paid at least one month before the election. The general election is held annually on the Tuesday next following the first Monday of November. Property owned at the time of marriage, or thereafter acquired, may be held by a married woman as her separate estate, and is not liable for the husband's debts. Her property is liable for debts contracted by her, and for necessaries for the support of the family of her husband and herself. She may dispose of her property by will, without the signature of her husband. By petitioning the court of common pleas, she may hold her separate earnings and income for her sole benefit. The grounds of divorce are impotence, adultery, desertion for two years, cruel treatment or indignities that render the condition intolerable and life burdensome, fraud, force, or coercion in procuring the marriage, sentence to two years' imprisonment for felony, and becoming a lunatic or *non compos mentis.* The legal rate of interest is 6 per cent. Pennsylvania is represented in congress by two senators and 27 representatives, and has therefore 29 votes in the electoral college. The national guard of the state is divided into ten divisions. In 1874 there were 19 regiments, 169 companies, 738 officers, and 8,261 enlisted men.—The public debt of the commonwealth on Dec. 1, 1874, amounted to $24,568,635, of which $24,371,884 was funded and $196,751 unfunded. The former embraced $19,821,530 in 6 per cent., $4,963,354 in 5 per cent., and $87,000 in 4½ per cent. loans. The total receipts into the state treasury during the year ending Dec. 1, 1874, were $5,871,968, and the expenditures $6,642,567; balance in the treasury, $1,054,551. In Pennsylvania there is no state tax upon real estate, and but a very light one on personal property, the revenues being derived principally from the taxation of corporations. Of the total revenue ($5,871,968) in 1874, $3,811,669 was received from corporations (including $2,936,509 from direct taxes and $875,160 from interest on bonds, commutation, &c.) and $2,060,299 from taxes on the people generally. Of the latter amount, nearly one half was derived from licenses, and was therefore an indirect tax on the people. The taxes derived from corporations during three years were as follows:

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* Including 11 m. of slackwater.

SOURCES OF REVENUE.	1872.	1873.	1874.
Railroad, canal, express, navigation, and transportation companies	$2,412,780 75	$2,869,082 80	$1,256,459 54
Coal, iron, improvement, mining, and manufacturing companies	488,197 88	660,588 52	578,879 64
Passenger railroad companies	74,184 40	74,587 19	48,984 11
Bridge, turnpike, and plank-road companies	81,231 61	84,868 25	27,611 24
Banks	841,021 31	842,499 68	829,698 80
Counties, cities, and boroughs	102,464 21	107,057 19	111,822 85
Gas and water companies	86,750 26	50,638 92	80,977 12
Oil companies	90,482 98	48,221 87	83,909 70
Telegraph companies	6,564 50	7,952 01	7,207 11
Insurance companies (domestic)	116,889 59	118,990 76	87,017 78
Insurance companies (foreign), licenses, &c.	351,896 08	358,490 78	292,775 07
Premiums on corporation charters	101,584 74	68,848 76	56,498 18
Annuity for right of way (Erie railroad)	10,000 00	10,000 00	10,000 00
All other companies and associations	24,698 01	46,686 00	82,283 87

The entire revenue in 1872 was $6,738,347, and in 1873 $7,077,078. The most important sources of revenue in 1874, other than taxes on corporations, were as follows:

Tax on personal property	$545,528
Tax on writs, wills, deeds, &c	157,783
Bonus or premiums on charters	56,498
Collateral inheritance tax	850,676
Retailers', tavern, &c., licenses	871,808
Collections on outstanding indebtedness	875,160
Miscellaneous	184,518

Of the total revenue of 1874, $3,054,989 was appropriated to the sinking fund, and $2,817,029 to the general expenses of the state government. The most important items of state expenditure for three years were as follows:

OBJECTS OF EXPENDITURE.	1872.	1873.	1874.
Senate	$171,845	$107,067	$184,460
House of representatives	236,689	260,768	269,084
Public printing	101,047	181,916	152,252
Executive department	30,330	40,508	14,320
Judiciary	331,474	348,916	358,800
Public offices	88,064	94,518	141,706
Military expenses	22,122	72,242	68,437
Constitutional convention	....	410,723	86,461
Publishing new constitution	....	....	202,782
Pensions and gratuities	54,881	50,834	48,889
Charitable institutions	441,527	439,307	689,889
Soldiers' orphan schools	471,986	469,308	419,295
Common schools	667,191	804,097	888,082
Loans redeemed, &c.	2,511,172	1,551,762	1,262,234
Interest on loans	1,706,082	1,568,029	1,466,374
Inspectors of coal mines	24,775	28,228	24,474
Public build'gs and grounds	29,686	90,591	101,738
Houses of refuge	71,900	55,825	42,500
Penitentiaries	58,324	78,862	68,762
Centennial exposition	....	....	71,815

According to the federal census, the true value of real and personal estate was $722,486,120 in 1850, $1,416,501,818 in 1860, and $3,808,340,112 in 1870. The total assessed value in 1860 was $719,253,335, including $561,192,980 real and $158,060,355 personal estate; and in 1870 $1,313,236,042, including $1,071,680,934 real and $241,555,108 personal estate. The total assessed value of real and personal estate was returned by the state authorities at $1,087,793,844 in 1873, and $1,770,765,415 in 1874, including real estate valued at $1,620,214,930, and personal estate at $150,550,485. The true value of real and personal estate in 1874 was reported at $3,425,325,415. The commissioners of statistics in 1874 estimated the value of taxable property in the commonwealth at $4,300,619,558, as follows:

Railroads, canals, and telegraphs	$313,918,735
Banks and money dealers	241,380,408
Insurance and manufacturing	120,000,000
Wholesale and retail merchants and liquor dealers, &c	200,000,000
True value of real and personal estate on assessors' books	3,425,325,415

A levy of 1 per cent. on this valuation would yield a sum equal to the taxation now imposed for all purposes.—Since 1869 the charitable and correctional institutions of the state have been subject to the general supervision of the board of commissioners of public charities, consisting of seven members, who are appointed by the governor and report annually to the legislature. A general agent and secretary visits the institutions and reports upon their condition, receiving a salary of $3,000. In 1874 the following appropriations were made by the legislature in aid of public institutions:

	NAME OF INSTITUTION.	Ordinary appropriations.	Total appropriations.
State.	Eastern state penitentiary	$27,500	$28,500
	Western state penitentiary	24,850	44,850
	State lunatic hospital, Harrisburg.	35,000	58,000
	Danville hospital	35,000	135,000
	Warren hospital	....	100,000
		$122,350	$365,850
Corporate.	Hospital for insane, Dixmont	$27,000	$37,000
	German hospital, Philadelphia	....	20,000
	Lackawanna hospital, Scranton	6,000	10,000
	Wilkesbarre hospital	5,000	5,000
	House of refuge, Philadelphia	35,000	35,000
	Reform school, Allegheny	19,500	119,500
	Pennsylvania training school for the feeble-minded	28,000	28,000
	Pennsylvania institution for blind.	39,000	50,416
	Pennsylvania institution for deaf and dumb	56,700	56,700
	Home for deaf mutes, Pittsburgh	2,000	2,000
	Sheltering Arms, Pittsburgh	5,000	5,000
	Industrial home for blind women.	2,000	2,000
	Northern home for friendless children, Philadelphia	5,000	5,000
		$225,200	$370,616
	Aggregate	$647,550	$736,466

Of the numerous institutions for the defective and dependent classes, the state owns the two penitentiaries and the hospitals for the insane in Harrisburg, Danville, and Warren, and annually contributes to the support of several private charitable corporations. The western penitentiary in Allegheny, opened in 1827, had during 1874 a total of 606 inmates, and 417 at the close of the year, Sept. 30. It was formerly conducted on the "separate" or cellular system. Weaving and cigar making are carried on in behalf of the state, and shoe making by contract. Convicts may acquire extra earnings. The cost of the institution in 1873 was $88,038, of which $24,350 was for salaries and $51,625 for other current expenses. The total income, besides state appropriations, was $69,054, that from weaving, cigar making, and shoe making amounting to $11,802. Secular instruction is given to the illiterate; the library contains 3,000 volumes. The eastern penitentiary in Philadelphia was opened in 1829. It is noted as being the only penal institution in the United States in which the separate system now exists. (See PRISONS.) The convicts are confined in separate cells (560 in number), where, except when from lack of room two are put into one cell, and the time devoted to exercise in separate yards, they work and pass their entire time alone. The number of convicts on Sept. 30, 1874, was 646, of whom 7 were females; 235 were reported idle. Manufacturing is done on account of the state, and consists of cordwaining, weaving, chair making, blacksmithing, cigar making, &c. The earnings of the convicts in 1873 amounted to $26,795, of which $3,175 was allowed to them for extra work. The entire income of the prison, exclusive of state appropriations, was $30,083; the amount expended for maintenance was $111,805, including $27,000 paid for salaries. Pennsylvania has 15 prisons combining features of the county jail and the penitentiary, intended for criminals sentenced for short terms of labor. The Allegheny county workhouse, erected in 1868, has 400 cells. It is maintained for reformatory as well as industrial purposes, and is a source of profit. The total number of convicts in the state on Sept. 30, 1874, was 2,083, or 1 to 1,835 of the estimated population (3,821,757), including 1,063 in the two penitentiaries, 143 in the Allegheny workhouse, and 877 in the county jails. This does not include 1,190 in county jails, the workhouse, and house of correction, summarily sentenced by magistrates or justices of the peace, or 449 in jail awaiting trial, and 67 for non-payment of fines, costs, &c. Including these, the whole number of adults in prison Sept. 30, 1874, was 3,789. According to the federal census, the number of persons convicted of crime during the year ending June 1, 1870, was 3,327. Of the total number (3,231) in prison at that date, 2,532 were native and 699 foreign born. Pennsylvania has two reformatories for juveniles: the house of refuge in Philadelphia, opened in 1826, and the reform school in Alleghany co., opened in 1854. The former has accommodations for 900, viz.: 500 white boys and 200 girls, and 120 colored boys and 80 girls. There is a separate department for colored children. The average number of inmates during the year ending Sept. 30, 1874, was 569·7, whose ages ranged from 5 to 18½ years. The average yearly cost, including all current expenses, was $149 90 each, and the net cost, after deducting earnings, was $90 79 each. Boys and girls are committed by courts or magistrates for crimes, incorrigibility, vagrancy, &c. The reform school in 1874 had an average of 284 inmates, among whom were white and colored children of both sexes; the number at the close of the year, Sept. 30, was 301. New buildings are in process of construction for this institution, on a farm of 500 acres at Morganza, Washington co., and are intended for the "family system." They will have accommodations for six families of boys and two of girls, with 50 children in each family. The number of insane in the state, as reported by the census of 1870, was 3,895; the number receiving treatment on Sept. 30, 1874, was reported at 3,080, viz.: 1,128 in the state hospitals, 1,075 in the Philadelphia almshouse, 425 in the insane department of the Pennsylvania hospital, 90 in the Friends' asylum, 1,095 in almshouses, and 157 supported by townships and overseers. Besides these, there were about 40 insane criminals in jails and penitentiaries. Of the entire number 20 per cent. were estimated to be curable. For the care of this class the state will have, with the completion of the institutions at Danville and Warren, hospital accommodations for 3,280, viz.: lunatic hospital, Harrisburg, 400; Danville, 600; Warren, 600; western Pennsylvania hospital, Dixmont, 450; insane department of Pennsylvania hospital, Philadelphia, 470;

Friends' hospital, Philadelphia, 100; insane department of Philadelphia city almshouse, 660. The first four of these are state institutions, though that at Dixmont is not owned or managed by the commonwealth. The hospital in Harrisburg was opened in 1851, and in 1874 had an average of 395 patients, who were maintained at an average cost of $286 08 each. Of the 380 inmates on Sept. 30, 1874, 176 were supported by the public. The western Pennsylvania hospital at Dixmont, 7 m. below Pittsburgh, is a corporate institution opened in 1857, where an average of 469·8 patients were maintained in 1874, at a cost of $244 50 each. Of the 510 remaining at the close of the year, 402 were supported by the public. The Danville hospital, opened in 1872, has present accommodations for 240; the buildings are not yet completed. The average number of patients in 1874 was 198·7; remaining at the end of the year, 238, of whom 186 were maintained by the public; average cost of support, $262 60. The construction of the northwestern hospital for the insane was begun at Warren in 1874 on a farm of 334 acres. The estimated cost is $1,000,000. According to the census of 1870, there were 2,250 idiots in Pennsylvania. Provision is made for the education of this class in the training school for feeble-minded children near Media, Delaware co. (See IDIOCY, vol. ix., p. 174.) The average number treated here in 1874 was 223, of whom 98 were females; the cost of support was $253 43 each. Of the 231 inmates on Sept. 30, 89 were wholly and 19 partially supported by the state; 30 were maintained by New Jersey, 2 by Delaware, 12 by Philadelphia, and 61 by parents and guardians. By the census of 1870, 1,767 blind and 1,483 deaf and dumb were reported in the state. The Pennsylvania institution for the blind, in Philadelphia, founded in 1833, has accommodations for 124 males and 84 females. An average of 197 pupils were instructed in 1874, at a cost of $317 92 each. Of the 200 pupils on Sept. 30, 1874, 130 were supported by the state. The students are taught various trades and occupations. The "home" connected with this institution, the industrial home for blind women, and the Pennsylvania working home for blind men in Philadelphia, are designed to furnish employment to blind adults. The state institution for the deaf and dumb, opened in 1820, is in Philadelphia. It has accommodations for 115 boys and 110 girls, and in 1874 had an average of 229 pupils, who were supported at a cost of $140 40 each. Of the 219 inmates on Sept. 30, 1874, 193 were state beneficiaries. Besides the ordinary instruction, shoemaking, tailoring, dressmaking, sewing, &c., are taught. Instruction is also afforded to this class by the home for deaf mutes in Pittsburgh, to which the state appropriated $2,000 in 1874. The township system for the support of the poor, which prevailed in provincial times, still continues in 32 counties of the state. In the larger and wealthier counties, however, which contain about four fifths of the wealth and population of the commonwealth, the improved system has been adopted of supporting the poor in one or more large almshouses, of which there are 57. The total number of persons relieved during the year ending Sept. 30, 1874, was 99,048. The number of paupers of all classes maintained in almshouses, Sept. 30, 1874, not including the insane in the Philadelphia almshouse, was 7,782, of whom 4,669 were males and 3,113 females; 6,884 were adults and 898 children; 1,226 were insane, 43 idiotic, 131 blind, and 50 deaf and dumb. The number receiving outdoor relief at the same time was 11,100, besides 847 township poor in districts or counties having no almshouses. Forty orphan asylums, homes for the friendless, &c., are chiefly supported by private contributions or churches; and there are ten hospitals maintained by endowments or private contributions. The number of persons supported by public charity during the year ending June 1, 1870, according to the census, was 15,872, at a cost of $1,256,024. Of the total number (8,796) receiving support at that date, 4,822 were native born, including 4,354 white and 468 colored, and 3,974 were of foreign birth. Since 1865 the state has appropriated $4,385,556 to the support and education of 7,391 soldiers' orphans in various schools throughout the state. The amount expended in 1874 was $450,879, and the number of orphans on Sept. 1 was 2,988. This charitable work of the state will cease in 1879; it is estimated that $1,200,000 more will be needed for the purpose.—The origin of public schools in Pennsylvania may be traced to the frame of government prepared by William Penn in 1682, which provided that the governor and council should "erect and order all public schools." In 1752 trustees and managers for such schools were appointed; the provisional constitution of 1776 provided for the establishment of a school in each county; in 1786 60,000 acres of land were set apart for public schools; and the constitution of 1790 required the legislature to "provide by law for the establishment of schools throughout the state in such a manner that the poor may be taught gratis." In 1819 an act was passed for opening free schools to indigent children between 5 and 12 years old, and in 1834 the foundation of the present school system was laid by the law providing free education for all persons between the ages of 6 and 21 years. Under this law, as amended by the constitution of 1873 and previous acts, the supervision of the public schools is vested in a state superintendent of public instruction with two deputy superintendents appointed by himself, 65 county and 21 city and borough superintendents elected by the school directors, and 6 directors for each district, who are elected by the people, and have power to levy and collect taxes, build and furnish school houses, employ and pay teachers, select text books, and manage the schools generally. County superintendents visit schools, examine teachers, and report yearly to the state superintendent, who makes an annual report to the legislature. The schools are chiefly supported by taxation. The school fund proper consists of local taxes and fines and an annual state appropriation, which the constitution of 1873 requires to be not less than $1,000,000. The appropriation of public money for sectarian schools is prohibited. Women are eligible to any school office. The school age is between 6 and 21 years. The following are the most important facts concerning the common schools of the state for two years ending June 1:

PARTICULARS.	1872–'3.	1873–'4.
Number of school districts...	2,070	2,071
" of schools..........	16,305	16,641
" of graded schools...	5,307	5,586
" of school directors..	13,576	13,750
" of superintendents..	......	86
" of teachers.........	19,089	19,827
Average salaries of male teachers per month.............	$42 69	$42 95
Average salaries of female teachers per month........	$34 92	$35 87
Average length of school term in months..................	6·67	6·73
Whole number of pupils.....	834,020	850,774
Average number of pupils....	511,418	543,026
Percentage of attendance upon the whole number registered	·61	·67
Average cost of tuition per month for each pupil.......	$0 96	$0 95
Cost of tuition for the year...	$4,325,797 47	$4,527,308 03
Cost of building, purchasing, and renting of school houses	$1,758,812 86	$2,160,514 87
Cost of fuel, contingencies, debt, and interest paid.....	....	$2,050,106 98
Total cost for tuition, building, fuel, and contingencies.	$8,235,120 41	$8,737,929 88
Aggregate cost..............	$8,345,836 41	$8,847,939 88
Value of school property.....	$21,750,209 00	$22,569,668 00

Besides the above, $450,879 49 was expended by the state for orphan and $110,000 for normal schools, making the aggregate expenditures for public education $9,408,819 37. The marked educational progress of the state outside of Philadelphia during the past decade is shown in the following:

PARTICULARS.	1865.	1870.	1874.
Number of districts.......	1,837	2,001	2,071
" of schools........	12,547	13,332	14,978
Time schools were open...	5 m. 14 d.	5 m. 21 d.	6 m. 8 d.
Number of teachers.......	14,286	16,097	17,664
Average salaries of male teachers per month.....	$31 82	$39 63	$41 83
Do. of female teachers...	$24 21	$30 55	$33 33
Whole number of pupils...	629,587	695,052	716,728
Average number of pupils.	396,701	434,912	463,809
State appropriations paid..	$210,184	$321,200	$521,345
Tax levied................	$2,437,640	$4,731,049	$5,737,838
Rate for school purposes, mills....................	5·89	7·76	7·55
Rate for school buildings..	3·63	5·39	5·03
Received from collector...	$2,318,069	$5,684,997	$6,808,917
Expenses for school houses	$374,459	$2,560,187	$1,600,181
Cost of instruction........	$1,990,777	$3,010,690	$3,596,094
Paid for fuel and contingencies................	$410,246	$307,718	$1,652,658

Annual censuses of the school population are not taken, but it is estimated that there are not fewer than 300,000 persons of school age who do not in any one year attend school. The federal census of 1870 reported 1,076,040 persons in Pennsylvania from 5 to 18 years of age, and 1,295,864 from 5 to 21, while the total number attending school was returned at 725,004. There were 131,728 persons 10 years of age and over unable to read, and 222,356 unable to write; of the latter, 126,803 were of native and 95,553 of foreign birth. Of the total population 21 years old and upward (1,733,773, of whom 1,268,101 were native and 465,672 foreign, 1,698,109 white and 35,634 colored), the number of illiterates was 190,838, including 61,350 white males and 116,261 white females, and 5,758 colored males and 7,469 colored females. Earnest efforts are made to secure properly qualified teachers for the public schools. Four kinds of teachers' certificates are issued: the state certificate, given by the board of examiners of the state normal schools, which entitles the holder to teach at any time and place in the state; permanent, granted by the state superintendent to holders of professional certificates, and good for one year throughout the state; professional, which is granted by the county superintendent, and confers the privilege of teaching in the county during his term of office and one year after; and provisional, also given by the county superintendent, and good for one year in the county. In 1857 a law was passed providing for the division of the state into 12 normal school districts and the establishment of a normal school in each, and prescribing general regulations for their management. Eight normal schools had been opened in 1874, and two more were in process of organization. These are not owned or directly controlled by the state, nor is tuition in them free. The state superintendent has the appointment of two state trustees for each school, and appropriations are annually made by the state in behalf of each. Up to 1874 these appropriations amounted to $280,000, including $60,000 appropriated in that year. The distribution is made by the governor, state superintendent of public instruction, and attorney general. Students intending to become teachers in the public schools of the commonwealth may receive from the state 50 cents a week and $50 on graduation; soldiers' orphans are entitled to $1 a week. The general statistics of the normal schools for 1873–'4 are as follows:

WHERE SITUATED.	Date of organization.	Number of instructors.	Number of pupils.	State appropriation in 1874.
Bloomsburg..................	1869	10	272	$5,000
Edinboro.....................	1861	10	558	5,000
Kutztown....................	1866	10	390	10,000
Mansfield....................	1862	10	242	5,000
Millersville..................	1865	24	826	15,000
Sagamore....................	1865	..	...	5,000
Shippensburg..............	1872	15	332	5,000
West Chester...............	1871	18	330	10,000
Total.................	....	..	...	$60,000

Teachers' institutes are held in every county, and were attended in 1873–'4 by 13,970 teachers, besides 1,772 directors, and about 100,000 citizens.—Instruction in agriculture and the mechanic arts is afforded by the Pennsylvania state college in Centre co., the name of the post office being that of the college. This institution was organized in 1854, but it was not until 1867 that the income arising from the lands granted by congress was appropriated to it. Besides a preparatory course, it has three courses of four years each: agricultural, scientific, and classical. No charge is made for tuition; pupils of both sexes are admitted. All students, except those in the junior and senior classes, are required to devote ten hours a week to agricultural or mechanical work; those excepted devote the same amount of time to practice in the laboratory, surveying, &c. The institution has an endowment fund of $500,000, and a farm of 400 acres. In 1873–'4 there were 10 instructors and 150 pupils, of whom 24 were females. The statistics of the universities, colleges, and schools of theology in 1874–'5, excepting those of Philadelphia, were as follows:

NAME OF INSTITUTION.	When organized.	Where situated.	Denomination.	Departments or courses.	No. of instructors.	Pupils in coll. dep't.	Pupils in all dep'ts.
Allegheny college	1815	Meadville	Methodist Episcopal	Collegiate and preparatory	6	70	183
Dickinson college	1783	Carlisle	" "	Collegiate	6	90	...
Franklin and Marshall college	1853	Lancaster	German Reformed	Collegiate, academical, and theological	14	71	157
Haverford college	1833	Haverford	Friends	Collegiate	7	49	...
Lafayette college	1832	Easton	Presbyterian	Classical, scientific, and law	27	319	...
Lebanon Valley college	1866	Annville	United Brethren		7	84	124
Lehigh university	1866	South Bethlehem	Episcopal	Preparatory, collegiate, and schools in science and literature	11	..	106
Lincoln university	1853	Lower Oxford	Presbyterian	Collegiate, normal, preparatory and business, law, theology, and medicine	10	74	147
Mercersburg college	1865	Mercersburg	Reformed	Preparatory, collegiate, and theological	10	54	100
Muhlenberg college	1867	Allentown	Lutheran	Preparatory and collegiate	8	41	110
Palatinate college	1868	Myerstown	Reformed	Preparatory and collegiate	9	20	209
Pennsylvania college	1832	Gettysburg	Lutheran	Preparatory and collegiate	11	88	159
St. Thomas of Villanova college	1842	Villanova	Roman Catholic	Classical, preparatory, scientific, and commercial	16	50	85
St. Vincent's college	1846	Latrobe	Roman Catholic	Commercial, classical, ecclesiastical, and philosophical	28	264	338
Swarthmore college	1869	Swarthmore	Friends	Preparatory, classical, and scientific	21	99	261
University at Lewisburg	1847	Lewisburg	Baptist	Preparatory, academic, and collegiate	7	74	255
Ursinus college	1870	Freeland	Reformed	Academic, collegiate, and theological	10	86	119
Washington and Jefferson col.	1802	Washington	Presbyterian	Collegiate and preparatory	8	140	175
Waynesburg college	1850	Waynesburg	Cumberland Presbyterian	Collegiate, normal, and commercial	12	146	270
Western univ. of Pennsylvania	1819	Pittsburgh	Not denominational	Preparatory, academical, scientific, and engineering	17	81	291
Westminster college	1852	New Wilmington	United Presbyterian	Classical, scientific, and preparatory	7	71	165
SCHOOLS OF THEOLOGY.							
Allegheny theological seminary of the United Presbyterian church	1825	Allegheny	United Presbyterian		4	44	...
Crozer theological seminary	1858	Upland	Baptist		5	46	...
Meadville theological school	1844	Meadville	Unitarian		7	20	...
Missionary institute	1859	Selin's Grove	Lutheran		6	11	...
Moravian college and theological seminary	1807	Bethlehem	Moravian		4	25	...
St. Michael's seminary	1845	Pittsburgh	Roman Catholic		5	45	...
Theological seminary of St. Charles Borromeo	1832	Lower Merion	" "		10	85	...
Theological seminary	1826	Gettysburg	Lutheran		6	..	...
Theological seminary	1825	Lancaster	Reformed		8	84	...
Theological department Lincoln university	1853	Lower Oxford	Presbyterian		5	16	...
Theological department Mercersburg college		Mercersburg	Reformed		2	8	...
Theological department Ursinus college	1869	Freeland	"		4	8	...
Western theological seminary of the Presbyterian church	1825	Allegheny	Presbyterian		6	74	...

Instruction in law and medicine is provided by Lincoln university; and in science, besides the state college, by Lafayette college, Lehigh university, Swarthmore college, Villanova college, Western university, and Westminster college. There are excellent institutions for the superior instruction of females in Philadelphia, Pittsburgh, Allentown, Beaver, Bethlehem, Blairsville, Chambersburg, Collegeville, Germantown, Lewisburg, Mechanicsburg, Media, Norristown, Washington, and York. The numerous educational institutions in Philadelphia are described in the article on that city.—According to the census of 1870, the whole number of libraries was 14,849, with an aggregate of 6,377,845 volumes. Of these, 9,883, with 3,328,598 volumes, were private, and 4,966, with 3,049,247 volumes, other than private, including the state library in Harrisburg, 30,000; 39 town, city, &c., 28,586; 29 court and law, 24,051; 115 school, college, &c., 267,223; 3,916 Sabbath school, 1,696,640; 732 church, 420,559; 18 of historical, literary, and scientific societies, 202,600; 30 of benevolent and secret associations, 49,435; and 86 circulating, 330,153. The whole number of newspapers and periodicals in 1870 was 540, having an aggregate circulation of 3,419,765, and issuing annually 241,170,540 copies. There were 55 daily, with a circulation of 466,070; 3 tri-weekly, 10,000; 2 semi-weekly, 17,700; 385 weekly, 1,214,395; 11 semi-monthly, 825,100; 73 monthly, 846,750; 8 quarterly, 31,200; 3 annual, 18,000. In 1874 the total number was reported at 735, including 74 daily, 2 tri-weekly, 485 weekly, 13 semi-monthly, 87 monthly, 2 bi-monthly, and 6 quarterly. The total number of religious organizations in 1870 was 5,984, having 5,668 edifices with 2,332,288 sittings and property valued at $52,758,884. The denominations were represented as follows:

DENOMINATIONS.	Organizations.	Edifices.	Sittings.	Property.
Baptist, regular	895	871	178,210	$8,157,500
" other	235	218	110,100	587,800
Christian	97	69	27,500	584,100
Congregational	40	36	14,450	818,200
Episcopal, Protestant	288	284	94,182	6,703,067
Evangelical Association	254	233	80,545	712,800
Friends	114	113	48,725	1,764,700
Jewish	15	14	7,750	681,000
Lutheran	904	841	339,128	6,474,022
Methodist	1,286	1,271	446,463	7,510,675
Miscellaneous	7	7	2,500	63,200
Moravian (Unitas Fratrum)	15	16	9,000	401,000
New Jerusalem (Swedenborgian)	11	7	1,950	78,000
Presbyterian, regular	739	723	304,828	9,626,950
" other	289	285	119,022	2,487,500
Reformed church in America (late Dutch Reformed)	10	10	5,300	298,000
Reformed church in the United States (late German Reformed)	712	657	270,835	8,746,820
Roman Catholic	362	319	197,115	6,675,050
Second Advent	3	3	725	11,500
Unitarian	4	4	2,050	68,800
United Brethren in Christ	201	183	60,860	489,800
Universalist	21	18	6,725	288,500
Unknown, local missions	4	4	1,875	28,500
" union	26	27	7,450	51,900

—Delaware bay and river were first explored under the auspices of the Dutch East India company from 1609 to 1624, when forts were erected and military jurisdiction was exercised. From 1624 to 1664 they continued in actual possession of both sides of the bay without much colonization. A colony of Swedes settled on the west bank of the Delaware in 1638, and until their surrender to the Dutch in September, 1655, prosecuted colonization, cultivating the soil, and in all their intercourse with the Indians acting essentially upon the same pacific principles which became world-renowned under the founder of Pennsylvania. The peaceful Swedes surrendered to the more powerful Dutch, aided by a naval force from New Amsterdam, in 1655, but still retained their language and national peculiarities until their final absorption by the colonists of William Penn, who treated them with marked kindness and consideration. In 1681 the territory west of the Delaware was granted to William Penn, who colonized it, and founded Philadelphia in 1682. Under the charter granted to Penn by Charles II. the present area of the state of Delaware was included, and called the lower counties; and they continued under the same proprietary until 1699, when a separate legislature was granted them, but not a distinct governor. The two colonies were so connected until the revolution of 1776. The grant to Penn was for territory really covered by the vague grants made to the New England colonies, Virginia, and Maryland; and though the lines on the east, north, and west were adjusted without difficulty, the boundary between Pennsylvania and Maryland was long a subject of contest by the heirs of the original proprietors, and it was finally settled by the survey of Mason and Dixon, begun in 1763 and completed in 1767. (See MASON AND DIXON'S LINE.) The original Swedish colony was unusually free from trouble with the Indians, and after Penn's colony was founded a remarkable and most successful peaceful policy was inaugurated with the savage tribes in contact with the colony. The settlers of the lower counties were, after the Swedes, originally mainly Friends. Their high character and steady energy made this one of the most flourishing colonial establishments, if not the most successful. It became the seat of learning, wealth, and refinement long before the revolution. Independence was proclaimed here, and the whole colony took a decided part in the revolutionary war. The first large accession to the population, next to the Friends, was a German immigration begun about 1730, which peopled several counties adjacent to Philadelphia, and has given prominence to that nationality in all the subsequent history of the state. Next was a considerable immigration of Scotch origin, but coming immediately from the north of Ireland, which was diffused largely over all the state from 1715 to 1725. The public affairs of Pennsylvania were administered under the government framed by William Penn in 1682 and subsequently amended until 1776, when a provisional constitution was prepared by a convention of which Benjamin Franklin was president. A new constitution was adopted in 1790, which has since been several times amended. In 1838 provision was made for electing, instead of appointing, county officers, the right of voting was limited to white persons, and the term of judicial offices was reduced from life to 10 and 15 years. In 1850 the judiciary was made elective by the people; in 1857 the state, county, and municipal authorities were prohibited from subscribing to the construction of internal improvements; and in 1864 soldiers in the field in time of war were guaranteed the right of suffrage. In 1873 an amended constitution was approved by the people by a vote of 253,744 against 108,594, and went into force on Jan. 1, 1874. In 1794 resistance, known as the "whiskey rebellion," was made by the people in the western part of the state to the enforcement of the United States excise law. Troops were sent to the disturbed district, but no blood was shed, and the movement soon ceased. Except a brief period when the seat of government was at Old Chester, Philadelphia was the capital during the entire period of the proprietary government. In 1799 Lancaster was chosen as the seat of government, and in 1812 Harrisburg became the capital. In September, 1862, Gov. Curtin called for 50,000 volunteer militia to repel a threatened invasion of the state by the confederates under Gen. Lee. The latter, however, after invading Maryland, retired without entering Pennsylvania. In October a body of confederate cavalry made a raid as far as Chambersburg, but soon retreated. For an account of the invasion of the state in 1863, see GETTYSBURG. In July, 1864, the confederates advanced upon Chambersburg, and nearly destroyed the town by fire. During the war Pennsylvania furnished 387,284 troops to the federal army, being 269,645 reduced to a three years' standard.

PENNY, an English coin and money of account, equal to $\frac{1}{12}$ of a shilling. It was the only coin generally current among the Anglo-Saxons, and the most ancient except the sceatta. The name seems to be the same as the German *Pfennig*, and connected with the old German *pfant*, a pledge, and the Latin *pendere*, to weigh out, hence to pay. It was made of silver, and weighed $22\frac{1}{2}$ grains troy, or $\frac{1}{240}$ of the Saxon pound, corresponding to the Roman *denarius*, $\frac{1}{240}$ of the *libra*. The ancient penny was divided by a deeply indented cross into four quarters, which might be broken apart; whence the terms halfpenny and farthing, which were not coined separately until the time of Edward I. In the reign of Edward III. its weight was reduced to 18 grains, in that of Edward IV. to 12, in that of Edward VI. to 8, and in that of Queen Elizabeth to $7\frac{23}{31}$, or $\frac{1}{62}$ of an ounce in silver, which value was retained till 1860. Copper halfpence and farthings were first coined in 1672, but the copper penny was not introduced till 1797; twopenny pieces were coined at the same time, but soon withdrawn because too large for circulation. In 1860 a new bronze coin was introduced to replace the old copper coinage. The bronze penny is of only about half the value of the old copper penny.

PENN YAN, a village and the capital of Yates co., New York, on the outlet of Keuka (formerly Crooked) lake, 1 m. from its foot and 6 m. W. of Seneca lake, 170 m. W. of Albany and 95 m. E. by S. of Buffalo; pop. in 1870, 3,488. It is centrally situated in the lake region of western New York, and has a brisk and growing trade. The Northern Central railroad connects it with the New York Central on the north and the Erie on the south. The Sodus Bay and Corning railroad, now (1875) in progress, is to connect it with the Pennsylvania coal region and Lake Ontario. Two steamers ply daily during the season of navigation to Hammondsport at the head of Keuka lake. The outlet of this lake furnishes fine water power, and is bordered throughout its course by the Keuka Lake canal. The principal manufactories are two flouring mills, a barrel factory, a planing mill, and an extensive malt house. The principal depot and storehouses of the Northern Central railroad are situated here, and a rolling mill and horseshoe nail manufactory are in course of erection. The county buildings stand on a public square in the centre of the village. There are two fire engine houses, a commodious public hall, five hotels, a national bank, an academic union school, two primary schools, three weekly newspapers, and five churches (Baptist, Episcopal, Methodist, Presbyterian, and Roman Catholic).—The village was incorporated in 1833. The name is composed of the first syllables of the words Pennsylvania and Yankee, some of the early settlers being natives of that state and some of New England.

PENNYROYAL (Lat. *pulegium regium*). **I.** A species of mint, *mentha pulegium*, having the general characters of the genus (see MINT), but with smaller leaves than in any other useful species, being seldom over half an inch long. It is a perennial, very common in the south of Europe, and found as far north as Denmark; and it also grows in portions of Asia and Africa. Its odor, due to an essential oil, is very strong, quite distinct from that of other mints, and to most persons much less agreeable. In former times it was held in high esteem, and its medicinal virtues are recorded by Dioscorides and by Pliny, who recommends it to be hung in sleeping rooms as more conducive to health than roses. Except as a domestic remedy, pennyroyal has fallen into disuse, as its properties are not different from those of other similar aromatics; the oil, which has the properties of the plant in a concentrated form, is kept in the shops. **II.** A plant so called in this country, which is not a mint, but belongs to a different genus, *hedeoma*, which differs from *mentha* in the shape of the flower, number of stamens, and other minute characters. American pennyroyal (*H. pulegioides*) is found over a large portion of the country, preferring arid situations; it is a much-branching, hairy annual, less than a foot high, with oblong-ovate, petioled leaves, and small bluish flowers, few in a cluster. Its aroma closely resembles that of the European pennyroyal, and it is used for similar purposes; its use is mainly confined to domestic practice, in the form of a warm infusion or tea, being regarded as useful in suppressed menstruation. The volatile oil is officinal; it has a reputation for repelling mosquitoes, black flies, and other insects annoying to the hunter or explorer in wooded regions, which experience does not confirm.

American Pennyroyal (Hedeoma pulegioides).

PENOBSCOT, the principal river of Maine, formed by the junction near the centre of the state, in the E. part of Penobscot co., of two chief branches. The western and larger rises near the Canada border, flows N. E. to Chesuncook lake, from the S. end of which it issues, and after a S. E. course of about 20 m. enters a group of ponds or lakes, including Pemadumcook, Millinoket, and Twin lakes. The eastern branch, also called Seboois river, proceeds from several small lakes in the N. part of Penobscot co., and has a nearly S. direction. The main stream pursues a course a little W. of S., receiving among its most important affluents the Piscataquis on the west, and the Mattawamkeag and Passadumkeag on the east, and falls into Penobscot bay. Its total length, from the source of the W. branch, is about 275 m., and from the junction about 135 m. The principal towns on its banks are Castine, Bucksport, and Orrington on the east, and Belfast, Prospect, Frankfort, Hampden, Bangor, and Oldtown on the west. To Bangor, 55 m. from its mouth, it is navigable for large vessels. Along its course it has numerous falls, affording valuable water power. At Bangor there is a tide of about 17 ft. resulting from the peculiar wedge-like shape of the lower part of the river.

PENOBSCOT, a central county of Maine, intersected by the Penobscot river; area, 2,760 sq. m.; pop. in 1870, 75,150. It has a diversified surface and a generally fertile soil. Formerly it comprised a very large territory, which has been gradually cut up to form other counties, and its outlines are very eccentric, it being composed of three parallelograms irregularly disposed. The county is intersected by the Maine Central railroad and the Dexter branch, the European and North American, and the Bangor and Piscataquis. The chief productions in 1870 were 39,475 bushels of wheat, 73,944 of Indian corn, 361,355 of oats, 90,765 of barley, 31,348 of buckwheat, 1,201,558 of potatoes, 1,368,921 lbs. of butter, 92,581 of cheese, 188,273 of wool, and 116,343 tons of hay. There were 9,263 horses, 14,815 milch cows, 4,378 working oxen, 15,482 other cattle, 46,429 sheep, and 5,050 swine. The number of manufacturing establishments in 1870 was 850, employing a capital of $4,658,390, and producing goods to the value of $10,556,944. The most important were 14 tanneries, 5 planing mills, 122 saw mills, 4 machine shops, 2 paper mills, 23 ship yards, 3 woollen mills, 7 iron founderies, 8 flour mills, 41 cooper shops, 10 manufactories of boots and shoes, 22 of brick, and 38 of clothing. Capital, Bangor.

PENOBSCOTS AND PASSAMAQUODDIES, small tribes of Indians in Maine, representing the tribe originally known to the French as Malecites and Etechemins, belonging to the Abenaqui group of Algonquins. (See ABENAQUIS.) They aided the colonists during the revolution, and received from Massachusetts a large reserve on both sides of the Penobscot river, part of which they afterward sold. The Penobscots number about 500, have a fund of $53,000 in the hands of the state, and reside chiefly on Indian island, opposite Oldtown, where they have a church, town hall, and schools. They are directed by a governor, lieutenant governor, two captains, and four councillors. The Passamaquoddies, also about 500 in number, reside at Denis island and Pleasant point, on the W. shore of Passamaquoddy bay, and on the Schoodic lakes. Both tribes are Roman Catholics, and several books have recently been printed for their use, in the Abenaqui dialect, by the Rev. E. Vetromile.

PENSACOLA, a city, port of entry, and the capital of Escambia co., Florida, situated on the N. W. side of the bay of the same name, about 10 m. from the gulf of Mexico, 180 m. W. of Tallahassee, and 53 m. E. S. E. of Mobile, Alabama; lat. 30° 24′ N., lon. 87° 20′ W.; pop. in 1850, 2,164; in 1860, 2,877; in 1870, 3,347, of whom 1,264 were colored. It is connected with the Mobile and Montgomery railroad by the Pensacola and Louisville line, 44 m. long. The country immediately around Pensacola is sandy, little cultivated, and covered with pines. The town itself, although a place of considerable political and commercial importance during the Spanish and English occupation, had until a year or two prior to the civil war presented a decayed appearance. At that time a large accession both to its trade and population took place, in consequence of the approach to completion of the railroad connecting it with Montgomery. Since the war it has had considerable commerce, and its lumber business is important. The value of foreign imports for the year ending June 30, 1874, was $23,964; of exports to foreign ports, $2,864,913. It has an excellent harbor, admitting vessels of a draught of 22 ft. The principal public buildings are a custom house and Roman Catholic, Episcopalian, Presbyterian, Methodist, and Baptist churches. There are several schools and academies, and two weekly newspapers. The remains of the old Spanish forts, San Miguel and St. Bernard, may be seen in the rear of the city. The climate is exceedingly healthful, except for occasional visitations of yellow fever. (For the navy yard and forts, see Pensacola Bay.)—There is some uncertainty with regard to the original settlement of Pensacola. It is believed that a few French colonists established themselves here about the year 1696. The place was in the possession of the Spaniards in 1699, about which time a colony of 300 emigrated thither from Vera Cruz. In 1719 it was captured by Bienville, but in 1723 it was restored to the Spaniards. In 1763 Pensacola, with the rest of Florida, passed into the occupancy of the British. It was again besieged and taken by the Spanish general Galvez in 1781; and in 1783 the whole province was retroceded to Spain. In November, 1814, the British forces, which had been permitted by the Spanish authorities to establish themselves at Pensacola, were driven out by Gen. Jackson, who assaulted and took the town and adjacent forts. In May, 1818, Jackson again took the town, and obliged Fort Barrancas, to which the Spanish governor had retired, to capitulate. This movement was made in consequence of the incursions of hostile Indians from Florida into United States territory, and the inability or unwillingness of the Spanish authorities to suppress them. By a treaty concluded in 1819, and executed in 1821, the whole province was ceded to the United States. On Jan. 12, 1861, soon after the passage by Florida of the ordinance of secession, a body of militia appeared before the navy yard and demanded its surrender to the state authorities. The yard and the adjacent forts were given up without opposition. Two days before this event, Lieut. Slemmer, commanding at Fort Barrancas, had crossed over with about 80 soldiers and marines to Santa Rosa island and taken possession of Fort Pickens, which he refused to surrender. Several national vessels were ordered to rendezvous off Santa Rosa island, but for two months they were not allowed to take any measures for the reënforcement of the fort, or even to furnish it with supplies, during the pendency of negotiations at Washington. On April 12 orders were sent that the fort should be reënforced; and a week afterward Col. Harvey Brown, with 750 soldiers and a considerable amount of artillery and supplies, arrived and took command. The confederates had collected a force on the mainland, under Gen. Bragg, who cut off supplies from the fort, and several times opened fire upon it, but at a range too great to inflict any damage. About the middle of June Wilson's regiment of New York zouaves was landed on Santa Rosa island, where they encamped on the bare sand outside of Fort Pickens. Early in October the confederates made a descent upon the island by night, penetrating into the camp of the zouaves, which was almost entirely destroyed, but retired on the approach of reënforcements from the fort. Two spirited but ineffectual engagements, consisting exclusively of an interchange of the fire of heavy artillery, afterward took place: one, opened by Fort Pickens and the vessels of the national fleet, in November, 1861; the other, opened by the confederates, on Jan. 1, 1862. Pensacola, with the navy yard and neighboring forts, was soon afterward evacuated by Gen. Bragg. They were immediately reoccupied by the federals, but the troops were afterward withdrawn to the navy yard, leaving the town a sort of neutral ground, liable to occasional temporary occupation by either belligerent. On Feb. 19, 1864, an accidental conflagration swept over five squares, destroying some of the most valuable buildings in the city.

PENSACOLA BAY, an arm of the gulf of Mexico, in the western part of Florida, extending inland about 30 or 35 m. in a N. E. direction. At a little more than half this distance from the sea it separates itself into two divisions, Escambia bay on the west, and on the east the bay of Santa Maria de Galvez with its subsidiaries, East and Black Water bays. The former receives the waters of the Escambia river; the latter, those of the Black Water and Yellow Water. The entrance of the bay, between Santa Rosa island on the east and the mainland on the west, is little more than 1 m. wide, but within it expands into a capacious harbor, from 4 to 8 m. in width, and entirely landlocked. There is a depth of about 22 ft. of water on the bar. The entrance of Pensacola bay is defended by Fort Pickens on the east, situated on the extreme point of the long, narrow island of Santa Rosa, and Fort McRee on the west, situated on the mainland. About 1½ m. to the north, and immediately in front of the entrance (the W. shore making an abrupt turn E.), stands Fort San Carlos de Barrancas. Near this fort are the lighthouse, extensive barracks, and the naval hospital. About a mile above the hospital is the navy yard, situated on Tartar point, where the shore again bends north. The villages of Warrington and Woolsey lie immediately adjacent to the wall of the navy yard. Seven miles above is the town of Pensacola. At the mouth of Black Water river is the village of Bagdad, where there are saw mills, sash manufactories, &c. Milton, a village of about 1,500 inhabitants, is 2 m. above. There is a large lumber trade on the shores of Pensacola bay and its tributaries.

PENSION, a regular allowance of money paid to an individual by a sovereign or government, in consideration of services rendered or in recognition of merit, civil or military. Most foreign countries have both civil and military pension lists, but in the United States pensions are granted, with a few exceptions, in consideration of military service alone. Military pensions are divisible into two general classes, invalid and gratuitous. Invalid pensions are granted to persons who have become disabled in the military or naval service, in consequence of wounds or sickness, so as to be in whole or in part incapable of supporting themselves and those dependent on them. Gratuitous pensions are given as rewards for eminent services, and are usually granted at the close of a war or of a term of service. In this class is properly included the half pay drawn by the families of those who have died of wounds or of sickness contracted in the service.—In the United States all matters relating to pensions are in charge of the commissioner of pensions, who is the head of a bureau in the department of the secretary of the interior. Payments are made quarterly at 58 agencies, established in different parts of the country. At each of these agencies a permanent roll is kept of all pensioners residing within its limits, arranged alphabetically by classes, sexes, &c. On this roll are entered all new pensions, new allowances to pensioners, reductions, suspensions, deaths, remarriages, transfers, variations of rates, and the post-office address of each pensioner. The disbursements at the various agencies range from $5,000 to $1,500,000 annually. Of the 278,021 soldiers who served in the revolutionary war, 57,623 received pensions for service, and the aggregate amount paid to them was $46,082,175 97. At the close of the fiscal year ending June 30, 1859, there were 165 soldiers of the revolution on the rolls, 102 of whom died during the two succeeding years. The last survivor pensioned under the general laws was Lemuel Cook of Clarendon, N. Y., who died May 20, 1866, aged 104 years. Of two pensioned under a special act of congress ($500 per annum), one, John Gray of Brookfield, Ohio, died March 28, 1869, aged 105 years, and the other, Daniel F. Bakeman of Freedom, N. Y., on April 5, 1869, aged 109 years. At the outbreak of the civil war all pensioners in the insurgent states were cut off from the benefit of the pension laws, and the names of those known to be disloyal were subsequently stricken from the rolls. In 1867 the names of widows who could prove their loyalty during the war were restored. This increased the number on the roll during that year, but they have since been gradually decreasing, and in the year ending June 30, 1874, only 326 applied for payment of pensions. The pensioners of the war of 1812–'14 were included among the invalids, widows, &c., on the general roll until the act of Feb. 14, 1871, by the terms of which a pension is awarded for 60 days' service to all survivors and widows of that war. The total number of enlistments of all kinds in the war of 1812 was 527,654, of whom 296,916 served 60 days or more; of this last number, 21,451 have been pensioned, and in 1874 17,620 were on the rolls as alive. Of the widows, 6,200 who were married prior to Feb. 17, 1815, have been pensioned. The total number of enlistments in the war with Mexico was 78,260, of whom 11,308 were pensioned as invalids. Of the 2,688,523 men enlisted in the civil war of 1861–'5, 119,589 had been pensioned as invalids up to 1874. The following table shows the number of pensioners enrolled in the various classes during each year from 1861 to 1874:

YEARS.	Revolutionary soldiers.	Widows of revolutionary soldiers.	Army invalids.	Widows, &c. (army).	Navy invalids.	Widows, &c. (navy).	Survivors of war of 1812.	Widows of war of 1812.	Total.
1861........	63	2,728	4,725	2,236	427	530	......	......	10,709
1862........	30	1,850	3,878	1,485	433	483	......	......	8,159
1863........	18	1,578	7,248	4,820	555	577	......	......	14,791
1864........	12	1,418	22,767	25,483	712	793	......	......	51,185
1865........	3	1,114	35,041	47,972	839	1,017	......	......	85,986
1866........	1	931	54,620	68,957	1,032	1,181	......	......	126,722
1867........	..	997	68,511	81,294	1,054	1,327	......	......	153,183
1868........	1	888	74,782	91,354	1,175	1,443	......	......	169,643
1869........	..	887	81,579	102,659	1,280	1,558	......	......	187,963
1870........	..	727	86,187	108,325	1,834	1,613	......	......	198,686
1871........	..	634	91,290	111,794	1,877	1,673	727	......	207,495
1872........	..	471	95,405	113,047	1,449	1,730	17,100	3,027	232,229
1873........	..	445	99,804	111,643	1,430	1,770	18,266	5,053	238,411
1874........	..	410	102,457	107,106	1,551	1,785	17,620	5,312	236,241

The several sums allowed per month to invalids of the various classes are as follows: lieutenant colonels and officers of higher rank in the army, and officers in the navy and marine corps ranking with them, $30; majors and other officers ranking with them, $25; captains and other officers ranking with them, $20; first lieutenants and those ranking with them, $17; second lieutenants and those ranking with them, $15; midshipmen and those ranking with them, $10; and privates and seamen, $8. The total amount paid in pensions from the foundation of the government to June 30, 1861, was $89,886,359 65. The following table exhibits the annual rate of all pensions paid by the United States from 1861 to 1874 inclusive, and the actual amount paid, the latter including arrears and expenses of disbursement:

YEARS.	Annual rate.	Amount paid.
1861	$957,772 08	$1,089,218 75
1862	752,711 71	790,819 94
1863	1,371,169 48	1,044,864 47
1864	4,595,376 88	4,521,622 18
1865	8,023,445 48	8,542,885 27
1866	11,674,474 81	18,250,980 17
1867	16,178,081 45	18,681,711 79
1868	19,224,188 95	24,079,408 18
1869	21,305,484 57	28,445,069 09
1870	22,260,200 10	27,780,811 81
1871	22,806,994 29	88,077,888 68
1872	25,480,578 80	80,169,341 00
1873	26,259,284 28	29,185,289 62
1874	26,244,786 46	80,593,749 56

The appropriation for the year ending June 30, 1875, was $29,980,000.—In Great Britain military and naval pensions are awarded for distinguished services, for long service, for wounds, and for disability incurred in the service. There are also superannuation allowances, pensions to needy widows, and compassionate allowances to orphan children. The amounts paid to army officers as rewards for distinguished services are, with few exceptions, £100 each; in the navy flag officers receive £300 annually and captains £150. Victoria cross pensions, which belong in this class, amount to £10 yearly. In 1874 there were 86 in the army and 18 in the navy who had received this decoration. Pensions for long service are given to non-commissioned officers and privates in the army, who have served 21 years in the infantry or 24 years in the cavalry, or sooner in cases of disability from wounds, loss of health, &c.; and to petty officers, seamen, and marines in the navy, under similar circumstances. Army pensioners of this class are either in-pensioners or out-pensioners of Chelsea or Kilmainham (Dublin) hospitals. In-pensioners have their home in the hospitals, and receive board, lodging, and tobacco money in lieu of their proper pensions; out-pensioners draw their money, amounting to from 1½*d.* to 3*s.* 10*d.* a day, from the staff officers of pensioners, one of whom is established in every large town, and live where they please. Navy in-pensioners are supported at Greenwich hospital, and the out-pensioners draw their pensions from the military staff officers, and also live where they please. Able-bodied pensioners are allowed to enlist in a defensive corps called the "enrolled pensioners," and draw pay during the yearly training. Pensions for wounds are limited to officers, and vary according to rank. They are sometimes granted temporarily when the injury is not permanent. Officers are retired on full pay or half pay, according to circumstances. In 1874 there were 370 of the former and 1,924 of the latter in the army list; and in the navy, 601 officers on the active list, 214 on the reserved list, 2,360 on the retired list, and 216 marine officers who were paid according to their respective positions. The militia, yeomanry, and volunteers also receive pensions under certain circumstances. The British army estimates for 1874–'5 provide for the following pensions:

Rewards for distinguished services	£84,000
Pay of general officers	81,600
Retired full and half pay	521,100
Widows' pensions, &c	146,800
Pensions for wounds	16,800
Chelsea and Kilmainham in-pensions	86,100
" " out-pensions	1,158,600
Superannuation allowances	172,100
Militia, yeomanry, and volunteers	20,900
Total	£2,187,500

The naval estimates for the same time provide as follows for pensions:

Half pay and retired pay	£870,166
Pensions and allowances	945,760
Total	£1,615,926

To this must be added the civil service estimates, for which, in the budget of 1874–'5, £528,196 were appropriated. Of this amount, £430,957 is for superannuation and retired allowances. Large pensions are attached to various political positions in Great Britain. Retired lord chancellors receive £5,000 per annum; and members of the cabinet and secretaries draw yearly pensions of from £2,000 to £1,000. Many authors, artists, men of science, and other classes, also receive annual pensions from the government.—In France pensions are awarded to civil, military, and naval officers, to ecclesiastics, and to those distinguished in literature, science, and the arts. Pensions called national recompenses are granted by legislative vote for distinguished services. In the budget for 1874, 42,400,000 francs were appropriated for civil pensions. In 1870 the amount paid in military pensions was 46,595,498 fr.; the appropriation in the budget of 1874 was 63,000,000 fr., exclusive of 3,668,000 fr. to old soldiers of the republic and the empire. In 1874 pensions to the amount of 86,000 francs were awarded to aged and infirm ecclesiastics. In 1669 pensions were given to men of letters to the amount of 111,550 livres, and in the year III. of the republic 605,500 livres were thus expended. Literary pensions are now generally in the form of some sinecure, or of a national dotation like that voted to Lamartine in 1867. Pensions under the title of national recompense were voted in 1874 to the amount of 428,000 fr. To this sum should be added 225,000 fr. for pensions granted under the empire to the widows or children of high officials, 104,000 fr. for pensions to peers and former senators, 90,000 fr. to the pensioners of the civil lists of Kings Louis XVIII. and Charles X., and 395,500 fr. in pensions and annuities to the employees of the civil list and of the privy household of Louis Philippe.—In the Russian budget for 1873, 24,786,589 rubles were appropriated for pensions, of which 24,367,827 were for permanent and 418,762 for temporary pensions. The empire of Germany in 1874 had a military pension list of 37,096,878 marks; in the same year Prussia paid in civil pensions 13,739,976 marks, Bavaria in pensions to widows and orphans 1,689,771 marks, and Baden in unspecified pensions

1,408,166 marks. The Austro-Hungarian monarchy paid in 1874 pensions amounting to 12,283,000 florins for the states represented in the Reichsrath, and 2,652,958 florins for those under the crown of Hungary. The pension list of Italy for 1873 amounted to 62,352,215 lire; of Sweden for 1875, 1,539,135 crowns; and of Denmark for 1874–'5, 1,703,966 rigsdalers, of which 1,405,715 were for civil and 298,251 for military pensions. In 1874 Switzerland paid 25,000 francs in military pensions. The budget of Turkey for 1874–'5 appropriated for pensions 64,000,000 piasters, and that of Egypt for 1873–'4, 2,000,000 piasters.

PENSIONARY, Grand, an officer of the Dutch republic, who bore the title also of advocate general, and was prime minister of the states or legislative body of the province of Holland. He was called grand pensionary in distinction from the first minister of the regency of each important town, who bore the title pensionary from the pension or salary attached to his office. In the assembly of the states he initiated bills, drew up reports, and collected the votes. He also conducted the diplomatic correspondence of the province, received ambassadors, superintended the finances, and permanently represented the province, the leading member of the Dutch confederation, in the states general. His term of office was five years, with privilege of reëlection. The most distinguished of the grand pensionaries were Barneveldt, Jan De Witt, and Heinsius, and the last was Schimmelpenninck, who held the office from March, 1805, to June, 1806, when the republic was succeeded by the kingdom under Louis Bonaparte.

PENTATEUCH (Gr. Πεντάτευχος, from πέντε, five, and τεῦχος, book), the collective name of the first five books of the Old Testament, which seems to have been first used by Origen. The Jews called it *Torah* (the Law) or *Torath Mosheh* (the Law of Moses). For centuries the Pentateuch was generally received in the church as written by Moses. Differences of style and apparent repetitions to be found in different parts of Genesis led eminent critics, like the Protestants Vitringa and Le Clerc, and the Oratorian Richard Simon, in the 17th century, to suppose that in the compilation of the book written documents of an earlier date had been made use of. In 1753 a work was published in Brussels by Astruc, professor of medicine at Paris, which maintained that throughout Genesis and in the first chapters of Exodus there are traces of two original documents, characterized by different names of God, the one by the name Elohim, the other by the name Jehovah. Besides these two principal documents, Astruc believed that Moses, whom he regarded as the author of the entire Pentateuch, made use of ten other sources of information. This view, which in the history of exegetical literature is known as the "documentary hypothesis," was adopted in part by Eichhorn, who extended it to the entire Pentateuch. It has been further developed by several German theologians, the most important of whom is Hupfeld, who besides the Elohim and the Jehovah documents assumed a third work by another and younger "Elohist," which three works in his opinion were combined by a fourth writer, called by him the "redactor," into the present Genesis. Some of the German theologians abandoned this theory in favor of another called the "supplementary hypothesis," which assumed the narrative of the Elohist to have been the foundation of the work, and to have been supplemented by the Jehovist or younger writer. More recently it has become a favorite practice of German critics to combine both theories and to find traces of more authors and of more than one general revision. The chief representatives of this latter view are Ewald, Knobel, Nöldeke, and Schrader, all of whom, though disagreeing in many particulars, assume at least three different writers in the first four books of the Pentateuch, as the oldest of whom they regard the Elohist, while Deuteronomy appears to them to be the work of a later writer, who once more revised and enlarged the first four books, and also edited the book of Joshua, and, according to Schrader, the books of Judges and Kings. This last revision they believe did not take place before the Babylonish captivity. Nearly all the theologians who suppose that the Pentateuch received its present form at a comparatively late period admit that some portions of the book, as the commandments, are undoubtedly of Mosaic origin.—The Mosaic authorship of the entire Pentateuch is still defended by many theologians, who hold that any other supposition is inconsistent with the plenary inspiration of the Bible; among these are Hengstenberg, Hävernick, Drechsler, Ranke, Welte, Keil, Douglas, and Bartlett. But some of these writers admit that, besides the account of the death and burial of Moses, a few words and sentences in other parts of the Pentateuch may have been interpolated at some later period. Many theologians hold that the documentary theory is consistent with the divine authority and inspiration of the writings attributed to Moses. —The entire question is reviewed by Schrader, in the 8th edition of De Wette's "Introduction to the Old Testament" (Berlin, 1869); by Vaipinger in Herzog's *Real-Encyklopädie*, articles *Pentateuch*, *Moses*, and *Mosaisches Gesetz;* and in Schenkel's *Bibel-Lexicon* (Leipsic, 1868–'74). (See COLENSO, JOHN WILLIAM.)

PENTECOST (Gr. πεντεκοστή, fiftieth), one of the three principal festivals of the Jews, so called in Greek and modern languages because it was celebrated on the 50th day after the feast of the passover, but originally called the "feast of weeks" (in the book of Tobit, ἅγια ἑπτά ἑβδομάδων, the feast of seven weeks), because it was celebrated seven weeks after the 16th day of the first month of the Mosaic calendar (Nisan). It was the feast of the first fruits of the harvest, and stood as the culmination of the consecrated season, and was characterized by a hospitable liberality and remembrance of the poor. Its distinguishing rite was the offering of two loaves of leavened bread from the new crop. In foreign countries, since the captivity, the Jews have prolonged it to two days, and in later times it has been kept as the commemoration of the revelation of the law on Sinai, of which it is the anniversary.—The day is also kept as a festival in the Christian church, and among Latin and Greek Christians ranks next after Easter. It commemorates the day when, as related in Acts ii., the Holy Ghost descended upon the apostles, and bestowed on them the gift of tongues. The conversion of 3,000 persons was held to be the beginning of the preaching of the gospel to all nations. The festival of Pentecost was in the early ages one of the favorite seasons for administering baptism; and as those who received it were clothed in white to symbolize the spiritual purity which baptism confers, the day acquired the name of Whitsunday or Whitsuntide.

PENZA. I. A central government of European Russia, bordering on the governments of Nizhegorod, Simbirsk, Saratov, and Tambov; area, 15,035 sq. m.; pop. in 1867, 1,197,393. The surface is level. There are six small lakes and several streams; but the only important rivers are the Sura and the Moksha, both tributaries of the Volga. Valuable iron mines are worked near Troitzk, millstones are extensively quarried, and large quantities of sulphur are found. More than half the surface is arable or meadow land, and there are extensive forests. Bee culture is one of the most important industries. There are iron works, glass works, tanneries, and numerous distilleries. II. A city, capital of the government, at the junction of the rivers Penza and Sura, 340 m. S. E. of Moscow; pop. about 28,000. It stands on an eminence, and is built principally of wood. Wool, linen, leather, soap, and silk are manufactured. An annual fair is held, which lasts from June 25 to July 4.

PENZANCE, a seaport and the most westerly town of England, on Mount's bay, Cornwall, 24 m. S. W. of Truro and 9 m. E. N. E. of Land's End; pop. in 1871, 10,406. It stands on a beautiful shore finely curved, and surrounded by rocky eminences. It has nine churches and several fine public buildings, the hall and museum of the Cornwall geological society, and a pier 600 ft. long with a lighthouse at its extremity. Tin and copper, which abound in the neighborhood, are exported in large quantities, as well as china clay and pilchards. The climate is remarkably mild, and numerous invalids resort thither.

PEON, a Spanish word signifying a day laborer. In Spanish America it is applied especially to Indian laborers. By the civil law under the Spanish colonial system, and by special statute in some countries, peons are compelled to work for their employers, provided they are in debt to the latter, until the debt is paid. It is alleged that many proprietors, by enticing the peons in their employment into needless expenditures, and by selling them goods and advancing them money, contrive to keep them hopelessly in debt and in a consequent state of bondage. The creditor, however, has no power over the wife and children of the peon, nor can the latter be sold like a slave. Peons in New Mexico formerly received wages at the rate of about $5 a month; but the system of peonage there was abolished by act of congress, March 2, 1867, and it has also been abolished in the Argentine Republic and one or two other South American countries.

PEORIA, a N. central county of Illinois, bounded S. E. by the Illinois river and Peoria lake, and drained by Spoon river and Kickapoo, Elbow, and Copperas creeks; area, 650 sq. m.; pop. in 1870, 47,540. It is intersected by numerous railroads centring at the county seat. It has a gently undulating surface and very fertile soil. The chief productions in 1870 were 124,104 bushels of wheat, 99,592 of rye, 969,224 of Indian corn, 334,892 of oats, 108,039 of potatoes, 254,482 lbs. of butter, and 22,086 tons of hay. There were 8,839 horses, 6,818 milch cows, 9,617 other cattle, 6,760 sheep, and 35,886 swine; 7 manufactories of carriages and wagons, 10 of brick, 18 of cooperage, 11 of furniture, 6 of iron castings, 11 of machinery, 9 of saddlery and harness, 16 of tin, copper, and sheet-iron ware, 11 distilleries, 6 breweries, and 9 flour mills. Capital, Peoria.

PEORIA, a city and the capital of Peoria co., Illinois, on the W. bank of the Illinois river, here spanned by a drawbridge, at the foot of an expansion of that stream called Peoria lake, 62 m. N. of Springfield, and 135 m. S. W. of Chicago; pop. in 1850, 5,095; in 1860, 14,045; in 1870, 22,849, of whom 7,357 were foreigners. It is beautifully situated on rising ground, above the reach of floods. The country back of the city is a fertile rolling prairie. Peoria is regularly laid out, with wide and well graded streets. In the centre is a public square. It has an extensive trade in flour, starch, lumber, agricultural implements, and carriages. Regular lines of steamers run to St. Louis and other points, and nine lines of railroads meet here, viz.: Chicago, Burlington, and Quincy; Chicago, Pekin, and Southwestern; Chicago, Rock Island, and Pacific; Indianapolis, Bloomington, and Western; Peoria, Pekin, and Jacksonville; Peoria and Rock Island; Toledo, Peoria, and Warsaw; Illinois Midland; and Toledo, Wabash, and Western. The manufactures are extensive, embracing foundery products, machinery, rolling mill products, steam boilers, ploughs and other agricultural implements, lumber, carriages, and malt and distilled liquors. There are three national banks, with an aggregate capital of $500,000, three savings banks, a county normal school, graded city schools, five daily and five weekly newspapers (two of each German), and 28 churches.—La Salle established a post on the site of Peoria in 1680, but the town was first permanently settled in 1819. It was incorporated as a city in 1844.

PEPIN, a W. county of Wisconsin, separated S. W. from Minnesota by the Mississippi river, and partly bounded E. and partly intersected by Chippewa river; area, 250 sq. m.; pop. in 1870, 4,659. The surface is level or gently undulating, and the soil fertile. The chief productions in 1870 were 97,990 bushels of wheat, 108,232 of Indian corn, 79,378 of oats, 27,187 of potatoes, 125,010 lbs. of butter, and 6,522 tons of hay. There were 958 horses, 1,298 milch cows, 2,778 other cattle, 2,746 sheep, and 2,818 swine. Capital, Durand.

PEPIN. I. Of Héristal, duke of the Franks, born about the middle of the 7th century, died in 714. He was the grandson of Pepin of Landen and the founder of the Carlovingian family. Inheriting part of the influence of his ancestors, who held the highest rank among the *leudes* or lords of Austrasia, Pepin, in concert with his brother Martin, the mayor of the palace, led the rebellion against King Dagobert II., who was murdered in 679. The two chiefs then received the title of "dukes of the Franks," and the kingly title in Austrasia was abolished. They attempted to subdue Neustria, which was then ruled by the mayor Ebroin, but were defeated near Laon in 680, when Martin was killed and Pepin remained the only chief of the Austrasians. Occasional hostilities took place during the following years, without any marked success; but Pepin in 687, having routed the Germans, invaded Neustria at the head of a formidable army. The contest ended in the battle of Testry, when Roman France, as northern Gaul was called, succumbed to Teutonic France; and thenceforth the duke was the acknowledged ruler of the whole Frankish empire. He permitted Merovingian princes to continue on the throne; but Thierry III., Dagobert II., Clovis III., Childebert III., and Dagobert III. were mere puppets, known in history as the *rois fainéants*, whom he kept under guard in some villa, bringing them forth but once a year in the national meeting of May, while he wielded unlimited authority. From 687 to 712 he was engaged in wars against the tribes on the banks of the Rhine, and especially the Frisians and the Alemanni. After repeated defeats, both were subdued. The latter days of Pepin were troubled by the rivalry between his legitimate wife Plectruda and his mistress Alpaida, the mother of Charles Martel. His own son Grimoald was murdered; and he bequeathed to his infant grandson under the regency of his widow a power which was soon seized upon by his natural son, whom he had imprisoned. **II. The Short** (*le Bref*), the first king of the Carlovingian dynasty, grandson of the preceding, and son of Charles Martel, born about 715, died in September, 768. On the death of his father in 741 he received as his share of the Frankish empire Neustria, Burgundy, and Provence, while his elder brother Carloman had Austrasia and the countries on the right bank of the Rhine. To strengthen his power, he placed on the throne a Merovingian prince, Childeric III., and contented himself with the title of mayor of the palace. In concert with Carloman, he forced the Bavarians, the Alemanni, and the Aquitanians into submission; but Carloman having retired to a convent in 747, Pepin made himself the ruler of the whole Frankish dominions. Availing himself of a favorable decision of Pope Zachary and the consent of the lords, he confined Childeric in the monastery of Sithieu, near St. Omer, and was solemnly crowned and anointed by St. Boniface at Soissons in 752. In the same year he received the submission of Septimania, which for several years had been held by the Saracens of Spain. In 753 he forced the Saxons to recognize his supremacy by paying a tribute of 300 horses and taking an oath to respect the Christian missionaries travelling among them. Pope Stephen III. now visited France to solicit assistance against the persecutions of Astolphus, king of the Lombards. Pepin received him with great honor, was crowned again by him, and started for Italy at the head of his army. He besieged Astolphus in Pavia, who sued for peace and assented to the terms dictated by his conqueror; but Pepin had scarcely left Italy when Astolphus broke the treaty and threatened the city of Rome. Pepin hastened to the rescue (755), conquered the exarchate of Ravenna, and gave it with the Pentapolis to the pope, thus founding the temporal sovereignty of the holy see. In 760 he invaded Aquitania, which under the heroic Waifar had asserted its independence. A dreadful war of eight years was waged, and the king of the Franks could only secure his conquest of that province by the assassination of his rival (768). Pepin died a few days after his return from his last expedition thither, leaving his kingdom to his two sons, Carloman and Carl or Karl, the latter of whom was afterward known as Charlemagne. Notwithstanding his shortness of stature, from which his surname was derived, Pepin was noted for extraordinary physical strength.

PEPIN I., king of Aquitania, born about 802, died in 838. The second son of Louis le Débonnaire by his first wife, he received from him in 817 the kingdom of Aquitania, while his youngest brother Louis had Bavaria, and the eldest, Lothaire, was associated in the government of the empire. In 829, when the emperor wished to change this arrangement in order to provide for Charles, who had been born to him by his second wife, Judith of Bavaria, Pepin joined his brothers in a rebellion against their father, whom they confined in a monastery; but soon becoming dissatisfied with Lothaire, who had seized upon the imperial authority, Pepin participated in the national assembly held in 830 at Nimeguen, which restored Louis to his throne. His father now threatening to take Aquitania from him, he rebelled again in 832, and in 833 all the three princes marched their troops to Alsace, took the emperor prisoner through the treachery of his own troops, conveyed him to Compiègne, and forced him to do solemn penance. But shortly after Pepin and Louis of Bavaria, disgusted once more with their elder brother's behavior, released their father and again acknowledged his supremacy.—**Pepin II.,** Pepin's eldest son, bereft of his inheritance, which was granted to Charles the Bald, the youngest son of Louis le Débonnaire, was nevertheless acknowledged as king by the Aquitanians. In 840 he joined his uncle Lothaire in his contest against Charles the Bald and Louis the German, was defeated with him at Fontenay in 841, and once more, by the treaty of Verdun in 843, deprived of his kingdom. He still held his ground, forced Count William of Toulouse into submission, routed the army of Charles the Bald near Angoulême in 844, and finally in 845 obliged his uncle to grant him the best part of Aquitania as a fief. But his popularity among the Aquitanians vanished when he allied himself with the Northmen. Abandoned both by his subjects and his allies, he took refuge in Gascony, but was betrayed into the hands of Charles the Bald in 852. Imprisoned in a monastery, he escaped in 854, induced a number of Aquitanians to rise in his behalf, again procured the assistance of the Northmen, and in 857 obliged Charles to grant him lands. But in a last attempt to take Toulouse at the head of the Northmen in 864, he fell into an ambush, was sent to Pistes, where he was sentenced to death by the lords of the kingdom, and was imprisoned at Senlis, where he soon died.

PEPOLI, Carlo, an Italian author, born in Bologna in 1801. He studied at the university of that city, and in 1831 became a member of the revolutionary provisional government. After its speedy overthrow he was captured by the Austrians on his flight to Corfu, and imprisoned, but soon banished from the country. He spent some time at Geneva with Rossi and Sismondi, wrote in Paris the libretto for Bellini's opera *I Puritani*, and was subsequently engaged on similar works. In 1837 he lectured in England on Italian history and art, and he was professor of Italian literature at the university of London from 1839 until the revolution of 1848, when he joined the movement in Italy. After serving in the Venetian territory under Durando, he was elected deputy in Rome and became vice president of the assembly. After the failure of the revolution in 1849 he returned to England, where he remained until the victories in Italy in 1859. Subsequently he filled various official posts. He has published several works in prose and poetry.

PEPOLI, Gioachino, marquis, an Italian statesman, born in Bologna, Nov. 6, 1825. He is a grandson of Murat and of Caroline Bonaparte, and married a princess of Hohenzollern-Sigmaringen. He urged Pius IX. to political reforms in 1846, and defended Bologna in 1848 against the Austrians. In 1859 he was at the head of the provisional government in the Romagna, and subsequently he became minister of finance and foreign affairs. In 1862 he was minister of agriculture and commerce, and afterward ambassador in St. Petersburg. His relationship with the Bonapartes enabled him to conclude, Sept. 15, 1864, the convention with Napoleon III. which stipulated the removal of the Italian capital from Turin to Florence, and the discontinuance of the French occupation of Rome. He has published several volumes of prose writings and of plays. His brother married the singer Alboni.

PEPPER (Lat. *piper*), the pungent fruit of a climbing shrub, *piper nigrum*, a native of the forests of Malabar and Travancore, and cultivated in various parts of the East and in the West Indies. The genus *piper*, which gives its name to a small family of apetalous, exogenous plants, consists mostly of climbing shrubs with alternate petioled leaves, diœcious or perfect flowers in solitary pendulous spikes opposite the leaves, each supported by a bract; stamens two or more; ovary solitary, containing a single ovule, and ripening into a one-seeded fruit with a fleshy exterior; in the species yielding pepper the stem is 12 to 20 ft. long, jointed and branching in a forked manner, the broadly ovate leaves five- to seven-nerved, and the flower spikes 3 to 6 in. long with 20 to 30 berries; the fruit, which is at first green, in ripening turns red and then yellow. Pepper was known to the ancient Greeks and Romans, two kinds having been described in the 4th century B. C., and it at one time occupied a much more important place in the world's traffic than now, it having been, before the days of cotton, coffee, and sugar, a principal article

Pepper (Piper nigrum).

in the traffic between Europe and India; tribute was levied in pepper, and it was often used as a medium of exchange; when Rome was besieged by Alaric, A. D. 408, he demanded as a ransom, besides gold and silver, 3,000 lbs. of pepper; in the middle ages the landlords exacted a given amount of pepper at stated times as rent. Dealers in spices were formerly called pepperers, and in the 12th century they formed a fraternity which was afterward merged in the grocers' company.—The plant is subjected to a rude kind of cultivation, in rich wooded valleys, where lofty trees maintain the requisite coolness and moisture; the vines planted in these localities propagate themselves by running along the soil and taking root; the natives tie up the ends of the vines to the nearest tree, the shoots above the tie hanging down; if no tree is at hand, poles are set for training the vines. The average product is 8 or 10 lbs. of berries to each plant, and this is maintained for 10 or 15 years, when it declines, and a new plantation must be made. In Malabar the vine flowers in May and June, and the harvest begins in the new year; as soon as a few berries upon a cluster turn red, the spike is picked, and the next day the berries are rubbed off by hand and dried on mats in the sun, or in baskets before a slight fire; if the berries are allowed to become thoroughly ripe upon the vine, there is much loss from dropping, and they are less pungent; when dried, the color is brownish black and the surface is much wrinkled. White pepper is the same as the black, it being prepared by removing the outer coating of the fruit; the berries are allowed to ripen and are then put into water and rubbed with the hands to wash away the pulp; when so treated it is less pungent, but is preferred by many from its not being readily seen in the food; when this is scarce in England, ordinary pepper is bleached with chlorine and used as a substitute. In commerce Malabar pepper bears the highest price, and that from Sumatra is the cheapest. Pepper acts as a stimulant to digestion; while it is regarded as useful in small quantities, large doses are capable of producing inflammation; when applied to the skin it causes reddening, and if the application continues long enough it will blister. Pepper in the ground state is frequently adulterated; besides grinding up the sweepings of warehouses with the pepper, various inert substances are added. Hassall found in ground pepper in London linseed-cake meal, wheat flour, pea flour, mustard husks, rape seed, &c.; and in white pepper bone dust is used; in this country old ship bread and Indian meal are often used in such adulterations. In 1819 Oersted discovered in pepper a crystallizing principle, which was at first supposed to be an alkaloid and the active constituent; but later Pelletier showed that it was neutral with some of the properties of a resin, and when perfectly pure without taste or odor; it has been used with some success as an antiperiodic. The pungent taste of pepper is due to an acrid concrete oil or resin, and its odor to a volatile oil. An Asiatic species, *P. trioicum*, furnishes a pepper esteemed in its native country, and the small quantities sent to England rank equal to the best Malabar.—Long pepper, which was probably known as early as the common kind, is scarcely ever seen in this country; it consists of numerous very small fruits attached to a stem, and is about an inch and a half long and a quarter of an inch thick, having somewhat the appearance of a slender mulberry; it has properties similar to the other, but is less powerful. Two species are said to furnish long pepper; these have been separated from the genus *piper* and placed in *charica*, the species standing now *C. officinarum* and *C. Roxburghii*. The principal consumption of this is in India.—For the Cayenne or red pepper, and the peppers of the gardens, see Capsicum; other species related to the common pepper are noticed under Betel and Cubebs.

PEPPERELL, Sir **William**, an American general, born at Kittery Point, Me., June 27, 1696, died there, July 6, 1759. He was brought up as a merchant. About 1727 he was elected one of his majesty's council for the province of Massachusetts, and he was regularly reëlected for 32 years in succession, and was appointed chief justice of the court of common pleas in 1730. When the expedition against Louisburg was undertaken, the governors of New England gave him the command of the troops. Beginning the siege in May, 1745, he soon compelled the city to surrender, and was made a baronet. Visiting England in 1749, he was commissioned colonel in the British army, became major general in 1755, and in 1759 lieutenant general. He was acting governor of Massachusetts from 1756 to 1758. He published an account of a "Conference with the Penobscot Tribe" (Boston, 1753). His life has been written by Usher Parsons (Boston, 1855).—His grandson was created a baronet in 1774, and embraced the royal cause during the revolutionary war, in consequence of which his estates were confiscated.

PEPPER GRASS, the name in this country of a garden annual (*lepidium sativum*) which in England is called cress; though both names are given in our seed catalogues, that first mentioned is the one in most common use. The genus *lepidium* (Gr. *λεπίδιον*, a little scale, referring to the small flat pods) belongs to the *cruciferæ* or mustard family, and is represented in all parts of this country by native and introduced species; the garden species is a native of west central Asia, and has been cultivated in England since 1548. It has deeply divided leaves, small white flowers, and minute orbicular flattened seed pods; it has the pungency common to the family in a pleasant form, and is cultivated exclusively for its young leaves, which are used as a salad, either alone or to mix with other salad plants. It is of rapid growth, and being of use only when young and tender, it is customary to make a sowing once a week in order to keep up a supply; any garden soil will suit it, and the seeds, when sown in shallow drills, come up very quickly; with us it can only be had in good condition early in the season, as hot weather causes it to run to flower very soon; in England the leaves are plucked separately, leaving the plant to produce others, but in our gardens it is generally cut. There are plain and curled varieties, and one with yellowish leaves called golden and Australian pepper grass. A related species found abundantly upon the shores of New Zealand was much valued by the early mariners as a remedy for scurvy.

PEPPERIDGE. See Black Gum.

PEPPERMINT. See Mint.

PEPPER TREE, the popular name on the Pacific coast for *schinus molle*, a South American tree much cultivated in California and elsewhere. The genus *schinus* (the Greek name for the mastic tree, and applied to this related genus) comprises about a dozen tropical American trees and shrubs, and belongs to the *anacardiaceæ*, the cashew-nut family, of which the sumachs are our most familiar examples. The pepper tree or false pepper grows 20 ft. or more high, with alternate unequally pinnate leaves, which have about 10 pairs of serrate leaflets and a longer terminal one; the flowers are diœcious, in axillary or terminal panicles; stamens 10; ovary one; the fruit is a berry of the size of a small pea, having a highly polished skin of a bright rose color, enclosing a succulent portion within which is a stony one-seeded nut, the surface of which is marked by six furrows containing oil. All parts of the tree are aromatic, being pervaded by a resinous liquid; their odor, especially that of the fruit, as well as taste, is almost precisely like that of black pepper. If the leaves of the tree are broken and the fragments thrown upon water, singularly life-like movements take place; the fragments appear to have the power of motion, and travel about the surface of the water by a series of jerks in a most interesting and amusing manner. This phenomenon is due to the sudden expulsion of the resinous oil from the tissues of the leaf, which reacting against the water propels the fragment of leaf; the forcing out of the oil is apparently due to the action of water upon the cells containing it, as it is noticed that the air in the vicinity of the trees is always filled with their peculiar fragrance immediately after a shower. In Peru the tree is called *mollé* or *mulli;* in that country the root is used medicinally, and a sort of resin which exudes from the stems is chewed to improve the gums; it is also purgative; the berries are used to make a sort of wine. In California the tree makes a handsome head, and its fragrance and the beauty of its fruit commend it for planting.

Pepper Tree (Schinus molle).

PEPSIN, the substance contained in the gastric juice and in the mucous membrane of the stomach, to which, in addition to its acidity, the gastric juice owes its power of converting the albuminoid constituents of the food into soluble peptones. It has probably never been isolated in a state of purity. Pepsin mingled with more or less foreign material may be obtained from the stomach of animals and used for the promotion of digestion in other animals or in the reagent glass. The various preparations containing it in a state of greater or less purity are called pepsines. These vary, as regards their digestive strength, within very wide limits. Several processes have been employed, usually beginning with the maceration in acidulated water or in wine of prepared and gently washed mucous membranes from calves' or pigs' stomachs. The latter menstruum gives rennet or pepsin wine. The acid solution may be preserved with glycerine or treated with various reagents to obtain solid pepsin. The process of Mr. Scheffer of Louisville, which gives a product both elegant and effective, precipitates the pepsin with a concentrated solution of common salt. It is then dried, and diluted with sugar of milk to a fixed strength. Other forms of pepsin are mixed with starch. The mucus may be scraped from the stomach and dried on a glass plate. The filtered gastric juice itself has also been used. If coagulated white of eggs or pieces of fibrine be placed in an acidulated solution of pepsin and kept at the temperature of the body, they will be gradually softened and dissolved. This process is a good one for estimating the relative value of different kinds of pepsin, the best of course dissolving the most. It does not, however, represent the extreme limits of its efficacy in the stomach, since it has been found by Mr. Scheffer that by separating a portion of the digested product, this in its turn is capable of continuing the process in an acid solution, the quantity of albumen which could have been digested by the original pepsin without renewal of acid being thus vastly exceeded.

The pepsin is thus seen to act as a ferment and not as a chemical solvent. Pepsin is used in many forms of dyspepsia. It is best prescribed in as simple a form as possible. It has also been employed as a dressing for malignant ulcers, to destroy the nerve in teeth, and to dissolve a piece of meat impacted in the œsophagus. Rennet wine is used in making cheese and in cookery. The activity of pepsin is impaired by the presence of alcohol, though this defect may perhaps sometimes be compensated by the stimulant properties of the wine.

PEPUSCH, Johann Christoph, a German composer, born in Berlin in 1667, died in London, July 20, 1752. For several years he was harpsichord teacher at the court of Brandenburg, and about 1698 emigrated to England, where he passed the remainder of his life. In 1710 he was one of the founders of the academy of ancient music, which subsisted for more than 80 years. As a composer he is chiefly known by his adaptation of popular airs for the "Beggar's Opera," for which he also wrote an original overture. He published a "Treatise on Harmony" (1731), and "Ancient Genera of Music" (in vol. xliv. of the "Philosophical Transactions").

PEPYS, Charles Christopher. See COTTENHAM.

PEPYS, Samuel, an English author, born Feb. 23, 1633, died May 26, 1703. He belonged to an ancient family, but his early life seems to have been passed in humble circumstances. He was educated at St. Paul's school, London, and at Magdalene college, Cambridge. In 1655 he married a young girl, without fortune, and went to live with his cousin, Sir Edward Montagu, afterward first earl of Sandwich, whom he accompanied a few years later on his expedition to the Sound. He was immediately afterward appointed to a small office in the exchequer. On Jan. 1, 1660, he began to keep a short-hand diary, which he continued uninterruptedly until May 31, 1669, when he was compelled by defective eyesight to give it up. Though an ardent roundhead in his youth, he expressed great joy at the restoration of Charles II., and accompanied Montagu in the capacity of secretary to the two generals of the fleet when he brought the king over. In the summer of 1660 he was appointed clerk of the acts of the navy. This office gave him constant opportunities for intercourse with the duke of York, with whom he was soon in great favor. During the plague of 1665 he had the whole management of naval affairs. He was one of the commissioners on the affairs of Tangier in 1662, and became treasurer to the commission in 1665. At the same time he was appointed surveyor general of the victualling office. When the officers of the navy board were called to the bar of the house of commons in 1668 to answer for the disaster to the British fleet in De Ruyter's expedition against Chatham, Pepys was chosen by his colleagues to conduct their defence, which he did in a speech of three hours with complete success. Though he was many years in parliament, he made no figure there. Shortly after the close of his diary he travelled on the continent, and collected information respecting the French and Dutch navies. He was not without his enemies; the earl of Shaftesbury attempted to show that he was "a papist or popishly inclined," with a view to defeat him in a contested election case before a committee of the house of commons, and some years afterward attempted to implicate him in the murder of Sir Edmundbury Godfrey. In 1673 King Charles appointed him secretary for the affairs of the navy. During the excitement of the popish plot he was accused with Sir Anthony Deane of sending secret particulars respecting the English navy to the court of France, and of being an enemy to the Protestant religion. After nine months' imprisonment he was discharged, the complainant retracting his deposition. Pepys had now lost his office, but in 1680 he attended the king at Newmarket, where he took down in shorthand his majesty's narrative of his escape after the battle of Worcester, which has often been published. In 1683 he accompanied Lord Dartmouth's expedition to Tangier. After his return he was appointed secretary for the affairs of the admiralty, a post which he continued to fill with remarkable ability until the accession of William of Orange, when he retired to private life. He was president of the royal society from 1684 to 1686. Pepys left to Magdalene college, Cambridge, his valuable collection of prints, books, and manuscripts, now known as the Pepysian library. Among them are manuscripts, naval memoirs, and a collection of English ballads in five large folio volumes, from which Bishop Percy partly derived his "Reliques of Ancient English Poetry." His diary, after lying unread for more than a century, was deciphered by a young collegian, Mr. John Smith, and part of it published, with a selection from his private correspondence, by Lord Braybrooke (2 vols. 4to, London, 1825). The Rev. Mynors Bright, president of Magdalene college, is about to publish (1875) a complete edition in six volumes from the original manuscript, to contain about one third more matter than Lord Braybrooke's. It is one of the most amusing books of its kind ever printed, and gives a unique insight into the manners and social life of the time of Charles II. Pepys published "Memoirs relating to the State of the Royal Navy" (8vo, 1690), and his "Life, Journals, and Correspondence," with his "Voyage to and Residence at Tangier," was published in 1841 (2 vols. 8vo). See also "Mr. Secretary Pepys," by J. G. Wilson (New York, 1867).

PEQUOTS, or **Pequods**, a tribe of Indians of the Algonquin family, occupying at the time of the settlement of the country a tract of 30 by 15 or 20 m., extending from Niantic river to Wecapaug in Rhode Island. They were called by the Dutch Sickenames, and seem to have branched off from the Hudson river Mohegans about the beginning of the 17th century. They soon conquered most of the tribes in Connecticut, and in 1633 sold to the Dutch the site of a fort on the Connecticut river. The next year they entered into a treaty at Boston, and made peace with the Narragansetts. But being disappointed in the trade which they expected from the English, they soon became hostile, and expeditions against them under Endicott and Gardiner made them unrelenting enemies. They attacked Wethersfield, and killed many settlers. An expedition under Mason was sent against them from Hartford in May, 1637. It was joined by Uncas, chief of the Mohegans, a branch of the Pequots. A Pequot fort near the present Groton was surprised early in the morning, entered, and fired. In the desperate struggle amid the burning wigwams, several hundred men, women, and children perished. Mason at once withdrew, pursued by the Pequots of another fort, who however were repulsed. The remnant of the tribe continued the war till they were defeated and nearly annihilated at Fairfield swamp. Sassacus, their chief, fled to the Mohawks, who killed him. Many of the Pequots were sold as slaves in the West Indies, and the remnant of the nation divided among three neighboring tribes, and all attempts to gather them as a tribe were repressed by arms. Two bands, however, gathered in time, one near New London, and one on the Pawcatuck. They were recognized in 1655, and laws were made for them. In 1667 Connecticut placed one band in Ledyard and one in North Stonington. They rendered good service in Philip's war, and in expeditions against the French. In 1776 each band numbered 150; in 1848 there were 16 Stonington and 28 Groton Pequots. Some removed to New York with the Brotherton Indians, and emigrated to Wisconsin, where a few of the great Pequot nation still are, the best and most thrifty of all.

PERA. See CONSTANTINOPLE, vol. v., p. 277.

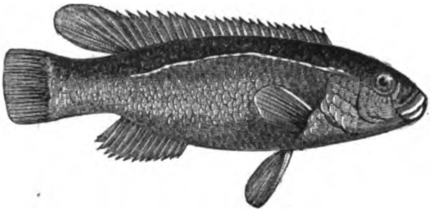
PERÆA (Gr. περαῖος, situated beyond), the classical name of the division of Palestine lying E. of the Jordan. The term thus corresponded to the *'eber ha-Yarden* (beyond the Jordan) of the Hebrew Scriptures; but in a narrower sense it was applied to that portion of the trans-Jordanic territory which lay between the Jabbok on the north and the Arnon on the south. (See PALESTINE, vol. xiii., p. 8.)

PERAMELES. See BANDICOOT.

PERCEVAL, Caussin de. See CAUSSIN.

PERCEVAL, Spencer, an English statesman, born in London, Nov. 1, 1762, assassinated in the lobby of the house of commons, May 11, 1812. He was the second son of John, earl of Egmont. In 1786 he was called to the bar, and in 1796 entered parliament. He was a warm supporter of Pitt, whose favorable notice he attracted by a pamphlet on the abatement of the impeachment of Warren Hastings. In 1801 he was appointed solicitor general in the Addington ministry, and in 1802 attorney general, in which capacity he conducted the prosecution in the celebrated case of Peltier, indicted for a libel on Bonaparte during the peace of Amiens. He retained his post on the return of Mr. Pitt to office. He was an earnest opponent of the Catholic relief acts, and on the accession of the Fox-Grenville ministry went into opposition. In 1807 he was appointed chancellor of the exchequer in the duke of Portland's cabinet, and in 1809 he succeeded him as first lord of the treasury and premier. He was shot by John Bellingham, an English merchant resident in Archangel, who, for some alleged injury by the Russian government, had been unable to procure redress either from the British ambassador in St. Petersburg or from the British ministry. Bellingham was convicted of murder and hanged.—See "Life of the Rt. Hon. Spencer Perceval," by his grandson Spencer Walpole (London, 1874).

PERCH, a name properly restricted to the *percidæ*, a very extensive family of acanthopterous fishes, characterized by a covering of ctenoid scales, the freedom and small size of the infra-orbital bones, large mouth, many of the fin rays unjointed and inflexible spines, seven branchiostegal rays, and the ventrals with five articulated rays and placed under or in advance of the pectorals. There are teeth on the vomer and generally on the palate, and the fins are always at least seven and sometimes eight; the cheeks are not cuirassed, and there are no barbels on the lips; the stomach is cæcal, and its pyloric opening on the side; pancreatic cæca few and small, and the intestinal canal but little folded. Only the typical genera can here be alluded to, and in the first place the genus *perca* (Cuv.), of which the common fresh-water perch (*P. flavescens*) of America and the *P. fluviatilis* of Europe are familiar examples. The old genus *perca* of Artedi and Linnæus has been subdivided into 36 genera according to the number and shape of the dorsals, the characters of the teeth, the serrations of the gill covers and shoulders, size of the scales, and other characters. In the restricted genus *perca* of Cuvier there are two dorsals (the second flexible), all the teeth villiform without canines, the opercular bones serrated, the operculum spiniferous, and the tongue smooth; 14 species are described, all inhabitants of fresh water. The yellow perch (*P. flavescens*, Cuv.) is greenish yellow above, and golden yellow on the sides, with seven transverse dark bands, widest above, and white below; centre of operculum deep green, iris golden, dorsals and caudal yellowish brown, pectorals yellow, and ventrals and anal scarlet. It attains a length of 12 to 15 in. and a weight of 2½ lbs., though most specimens are below 10 in.; it is very generally distributed in the lakes, ponds, and streams of the northern and middle states and of the British provinces; it is easily taken by the hook or net, and is an excellent fish for the table. The *P. fluviatilis* (Linn.) is very common over Europe and most of the northern parts of Asia; the body above is greenish brown, passing into golden-yellowish white below, and on the sides are from five to seven blackish bands; the dorsals and pectorals brownish and the other fins vermilion; it is a bold biter, and its flesh is excellent; it is voracious, omnivorous, and tenacious of life out of water; it deposits an immense number of eggs united by a viscid substance into lengthened strings. In some allied species the single dorsal is deeply notched, and the villiform teeth are interspersed with canines.—There are some sea perches belonging to the genus *serranus* (Cuv.), with a single dorsal, canines, preoperculum rounded at the angle and smooth, two or more spines on operculum, and the jaws not scaly; there are 26 species, many of them handsome fishes, abundant in the warmer seas, and some of them known to the ancients under the name of *perca*. The allied genus *anthias* (Bloch), smaller, with brilliant colors and scaly jaws, was famous in ancient times, and, according to Aristotle, was called sacred by the sponge fishers, because no voracious fishes came to the places it frequented to annoy the divers. In other genera the dorsal is single and canines are absent, as in *centropristis* (Cuv.), which includes the fish often called black perch; this, with other fishes of the genera *labrax* (Cuv.), *grystes* (Cuv.), and others called white, ruddy, and sea perches, have been described under Bass. The bream (*pomotis vulgaris*, Cuv.) is often called pond perch; the white perch of the Ohio is the *corvina oscula* (Lesueur).—The salt-water perch, conner, or chogset, so common around the rocky shores of New England and the British provinces, is a cyclolabroid fish of the genus *ctenolabrus* (Cuv. and Val.). In this fish (*C. cæruleus*, De Kay) the body is elongated and scaly, the preoperculum finely denticulated, lips thick and fleshy, a row of conical teeth in each jaw and a band of villiform ones behind these, the scales cycloid, and the anal fin with three spinous rays. It varies exceedingly in size and colors, being from 6 to 16 in. long; it is generally bluish, but presents various tints of brown, rusty, coppery, reddish, or green, often with black dots, and irregular bluish lines on the head; the front teeth are larger than the others, and the upper jaw is very projectile; there is a single dorsal, with 18 strong spinous rays. It is an excellent pan fish, and is taken in great numbers from June to October.



Salt-Water Perch (Ctenolabrus cæruleus).

PERCHE, Le, an ancient division of France, in the old province of Maine, bounded N. by Normandy, and now included in the departments of Orne, Eure-et-Loir, and Eure. In the middle ages it formed a county, which was permanently united to the crown in the 16th century. The capital was Mortagne. The district is noted for its draught horses, called *percherons*.

PERCIVAL, James Gates, an American poet, born at Berlin, Conn., Sept. 15, 1795, died at Hazel Green, Wis., May 2, 1856. At the age of 14 he wrote a burlesque poem on the times. He graduated in 1815 at Yale college, his tragedy of "Zamora" forming part of the commencement exercises. After teaching some time in Philadelphia he began the study of medicine, and in 1820 received his degree, but soon relinquished practice. In 1821 he published a volume of poetry, which contained the first part of "Prometheus" and a few minor poems. Having removed to Charleston, S. C., he published there in 1822 the first number of the "Clio," a pamphlet of about 100 pages, consisting principally of verse with a few prose essays added; a second part was composed entirely of verse. In 1823 he published in New York a collection of his poems, which was republished in London in 1824. In the latter year he was appointed assistant surgeon in the United States army, and was detailed to West Point as professor of chemistry in the military academy; but he soon resigned, and was made surgeon in connection with the recruiting service in Boston. There he contributed to the "United States Literary Gazette," and edited several works, one of which was a republication of Vicesimus Knox's "Elegant Extracts." In 1827 he removed to New Haven, and the same year published the third part of "Clio," and commenced an edition of Malte-Brun's geography, which was finished in 1832. He was also during the year 1827-'8 engaged in assisting in the preparation for the press of Webster's "Dictionary." In 1835 he was appointed, in connection with Prof. Charles U. Shepard, to make a geological and mineralogical survey of Connecticut, his report of which was published in 1842. From 1841 to 1844 he contributed to the New Haven journals metrical versions of German, Slavic, and other lyrics, and in 1843 published "The Dream of a Day." In 1853 he was engaged by the American mining company to survey their lead-mining region in Wisconsin, and in the following year he was appointed geologist of that state. The first report was published in 1855, and he was preparing the second when he died. A complete edition of his poems was published in Boston in 1859 (2 vols. 8vo); and his life has been written by the Rev. J. H. Ward (Boston, 1866).

PERCIVAL, Thomas, an English physician, born in Warrington, Lancashire, Sept. 29, 1740, died in Manchester, Aug. 30, 1804. He was educated at the Warrington academy and at Edinburgh, and received the degree of M. D. at

Leyden in 1765. In 1767 he settled at Manchester in the practice of his profession, and in 1781 founded the Manchester literary and philosophical society. In the latter years of his life he turned his attention to moral philosophy, and several of his works on that subject became very popular. In religion he was a dissenter. He wrote a large number of works, most of the earlier of which appeared originally in the "Philosophical Transactions" of London or Manchester, and were republished under the title of "Essays, Medical and Experimental" (3 vols. 8vo, 1767–'78). Among his other works are: "A Father's Instructions, consisting of Moral Tales, Fables, and Reflections, designed to promote the Love of Virtue" (2 vols. 8vo, 1775–'7); "Moral and Literary Dissertations" (8vo, Warrington, 1784); and "Medical Ethics, or a Code of Institutes and Precepts adapted to the Professional Conduct of Physicians and Surgeons" (8vo, Manchester, 1803). After his death his works were collected, with a memoir and letters, by his son (4 vols. 8vo, London, 1807).

PERCUSSION, in medicine. See AUSCULTATION, vol. ii., p. 126.

PERCUSSION CAP. See EXPLOSIVES, vol. vii., p. 39.

PERCY, the name of an English historical family, descended from William de Percy, who derived his name from the village of Percy in lower Normandy. He accompanied William the Conqueror to England in 1066, became a feudal lord, and died near Jerusalem in the crusade of 1096–'9. With the death of the third baron in the reign of Henry II. the male line of Percy became extinct. His granddaughter Maud married the earl of Warwick and died without issue. Her sister Agnes married Jocelin of Louvain, who took the surname of Percy. Henry de Percy in the reign of Edward I. acquired the barony of Alnwick. The third Henry of Alnwick in the reign of Edward III. married Mary, daughter of Henry, earl of Lancaster and grandson of Henry III., and Richard II. in 1377 created one son by this marriage earl of Northumberland and another earl of Worcester. The son of this earl of Northumberland was Henry Percy (born May 20, 1364), the famous Hotspur of history, who rebelled with his father against Henry IV., and was killed at the battle of Shrewsbury in July, 1403. His uncle was beheaded soon after the battle, and the earldom of Worcester became extinct. His father was killed by the posse comitatus of Yorkshire in 1408. In 1414 Henry V. restored the earldom to Hotspur's son Henry, who was killed in the battle of St. Albans in 1455. The third earl was killed in the battle of Towton in 1461. The fourth earl was murdered in 1489, with some of his attendants, in Cockledge, Yorkshire, by the populace, who called upon him to present their grievances on the subject of taxation. The fifth earl took part in Henry VIII.'s French campaign (1513), and died in 1527. The sixth earl, Henry Algernon, dying without issue in 1537, and his brother, Sir Thomas Percy, having been attainted and executed, Edward VI. in 1551 conferred the title of duke of Northumberland upon John Dudley, earl of Warwick (see DUDLEY); but after he perished on the scaffold, Queen Mary in 1557 created Thomas, son of the attainted Sir Thomas, earl of Northumberland, with remainder to Henry his brother. He conspired against Elizabeth, was beheaded at York in 1572, and would have been attainted but for the reversion in favor of his brother, who succeeded as eighth earl. He was committed to the tower for alleged participation in a supposed plot in favor of Mary, queen of Scots, and was found dead in his bed there, June 21, 1585, having been shot with three bullets from a pistol. His son Henry, ninth earl, after an ineffectual attempt to involve him in the gunpowder plot (1605), was fined £30,000 and imprisoned for several years in the tower. His son Algernon, tenth earl, took an active part during the rebellion against Charles I., but subsequently favored the restoration. Josceline, eleventh earl, died in 1670 without male issue, and the title became extinct. In 1674 Charles II. created George Fitzroy, his natural son by the duchess of Cleveland, earl and afterward duke of Northumberland, but he died without issue in 1716, and the title again became extinct. In the mean time Elizabeth, daughter of the eleventh earl, was in her own right Baroness Percy, and her husband, Henry Cavendish, earl of Ogle and son of the duke of Newcastle, assumed the surname of Percy, but died without issue. Elizabeth then married Charles Seymour, duke of Somerset, and the eldest son of that marriage, on the death of his mother in 1722, took his seat in the house of lords as Baron Percy. He inherited the dukedom of Somerset in 1741, and was created earl of Northumberland in 1749, with remainder to Sir Hugh Smithson, who had married his only surviving daughter, Elizabeth Seymour. Sir Hugh succeeded to the title on the death of his father-in-law in 1750, obtaining from parliament permission to assume the surname and arms of Percy. In 1766 he was created Earl Percy and duke of Northumberland. The fourth duke (born Dec. 15, 1792, died Feb. 12, 1865), a distinguished naval officer and man of science, was president of the royal institution, and in 1852 became first lord of the admiralty. At his death his title passed to his cousin, George Percy, second earl of Beverley. He died Aug. 22, 1867, and was succeeded by his son, Algernon George, born May 2, 1810, the sixth and present duke of Northumberland. Northumberland house, Charing Cross, long one of the historical mansions of London, was sold in 1873 for about £500,000 to the board of public works, to be pulled down for the purpose of opening a new street, and the duke devoted a portion of the purchase money to the embellishment of Trafalgar square.

PERCY, Thomas, an English scholar, born at Bridgenorth, Shropshire, April 13, 1728, died at Dromore, Ireland, Sept. 30, 1811. He took orders, and received in 1756 the rectory of Wilby and vicarage of Easton-Mauduit, Northamptonshire. His first literary production was the translation from the Portuguese of vol. iv. of a Chinese novel entitled "Hau Kiou Choan" (4 vols., 1761), the first three volumes having been translated previously. This was soon followed by "Miscellaneous Pieces relating to the Chinese" (2 vols., 1762); a translation from the Icelandic into Latin and English of five pieces of runic poetry (1761-'3); a new version of Solomon's Song, with notes and a commentary (1764); and a "Key to the New Testament" (1769). The "Reliques of Ancient English Poetry," to which he owes all his present celebrity, appeared in 1765. The greater part of the collection was taken from an old manuscript in the editor's possession, and many other pieces were obtained from the Pepysian library. It has been many times republished, a new edition appearing in New York in 1867. In 1766 Percy was appointed domestic chaplain to the duke and duchess of Northumberland, in 1769 chaplain in ordinary to the king, in 1778 dean of Carlisle, and in 1782 bishop of Dromore in the county Down, where he passed the rest of his life. In his latter days he became totally blind. Dr. Percy was a poet of considerable merit. His "Nancy, wilt thou come with me?" and "The Hermit of Warkworth" (1771), a poem connected with the history of the noble family of Percy to which he was reputed to belong, are well known; and the beautiful ballad of "The Friar of Orders Gray," which appears in the "Reliques," is mostly his own composition. He also published in 1770 the "Northumberland Household Book," and a translation of Mallet's "Northern Antiquities."

PERDICCAS, a general of Alexander the Great, assassinated near Memphis in 321 B. C. He was descended probably from the royal house of Orestis, a Macedonian province, and early attached himself to the court of Philip, at the time of whose assassination (336) he was an officer of his body guard. Under Alexander he commanded a division of the phalanx at the battles of the Granicus, Issus, and Arbela, and was afterward frequently employed in separate commands. When Alexander made a distribution of honors at Susa, Perdiccas received a crown of gold, and a daughter of the satrap of Media in marriage. After the death of the king (323) he bore a prominent part in the troubles between the cavalry and the infantry, and after the settlement of the quarrel he was made regent under the title of chiliarch of the horse guards, Philip Arrhidæus, half brother of Alexander, being nominally king. He succeeded in crushing Meleager, his co-regent, with all of his principal partisans, and managed for a time to retain his power in security. In 322 he invaded Cappadocia, defeated its satrap Ariarthes in two battles, and reduced the country. Afterward he marched into Pisidia, and captured Laranda and Isaura. He married Nicæa, daughter of Antipater, and put to death Cynane, the half sister of Alexander; but this aroused so much indignation among the soldiers, that he was forced to marry her daughter to King Arrhidæus. An attempt to bring Antigonus to account for his conduct in the management of his government led to hostilities. Antigonus fled to Macedonia, and Antipater, Craterus, and Ptolemy leagued against Perdiccas. He determined to attack Ptolemy, and, leaving Eumenes in command in Asia Minor, marched as far as the Nile without opposition. In attempting to cross that river he was repeatedly repulsed, and in the last effort lost so many men that the discontent in his army broke out in open mutiny. Several officers, headed by Seleucus and Antigenes, went to his tent and despatched him.

PERDIDO, a small river and bay, which form the W. boundary of Florida, separating Escambia co. in that state from Baldwin co. in Alabama. Perdido bay is more properly a lake, into which the river expands near its mouth. It is landlocked, and its outlet into the gulf of Mexico is so small, and enters at so acute an angle with the line of coast, as to be almost undistinguishable from the sea, whence the river probably derived its Spanish name *Perdido*, or "lost." There are generally but 4 or 5 ft. of water on the bar at its mouth. The Perdido was the boundary between the French and Spanish colonies of Louisiana and Florida.

PÈRE DUCHESNE. See HÉBERT, JACQUES RENÉ.

PEREGRINE FALCON. See FALCON.

PEREIRA, Jacob Rodriguez, a Spanish instructor of deaf mutes, of Jewish family, born at Berlanga, Estremadura, April 11, 1715, died in Paris, Sept. 15, 1780. He opened a school for deaf mutes at Cadiz, but was not able to maintain it, and about 1742 removed with his family to Bordeaux. In 1745 he taught a mute in La Rochelle to pronounce some words, and undertook the instruction of the deaf and dumb son of the comptroller, D'Étavigny. After some years he appeared before the academy of sciences in Paris with young D'Étavigny, whose proficiency excited their admiration. A few months later he appeared with his pupil before Louis XV., who bestowed on Pereira a pension of 800 francs. In 1754 he presented one of his pupils before the ex-king Stanislas of Poland. (See DEAF AND DUMB, vol. v., p. 733.)

PEREIRA, Jonathan, an English pharmacologist, born in London, May 22, 1804, died there, Jan. 20, 1853. At the age of 14 he was apprenticed to a surgeon and apothecary, and in March, 1823, received a license to practise from the society of apothecaries. On his appointment not long after as apothecary of the Aldersgate street dispensary, he became a private tutor, and published several works, chiefly for the use of students about to be examined.

He translated the Latin pharmacopœia of the London college of physicians, and published Latin prescriptions under the title of *Selecta e Præscriptis*. He also compiled "A General Table of Atomic Numbers," and in 1826 was appointed lecturer in chemistry in the Aldersgate street school of medicine. His lectures were published under the title of "Elements of Materia Medica and Therapeutics," and to this work he owed his reputation. In 1851 he became physician to the London hospital. He also published a work on "Food and Diet" (1842), and wrote a series of "Lectures on Polarized Light."

PEREIRA DA SILVA, João Manoel, a Brazilian historian, born in Rio de Janeiro in 1818. He studied in Paris, and became an advocate, distinguished for his eloquence in defending liberal principles. In 1844 he was returned to the Brazilian parliament. His principal work is *Historia da fundação do imperio brazileiro* (6 vols., Rio and Paris, 1864 *et seq.*). He has also published *Plutarcho brazileiro; Obras politicas;* and a work on Portuguese literature, with an account of the Brazilian literature of the present day.

PEREIRA DE SOUZA. See CALDAS PEREIRA DE SOUZA.

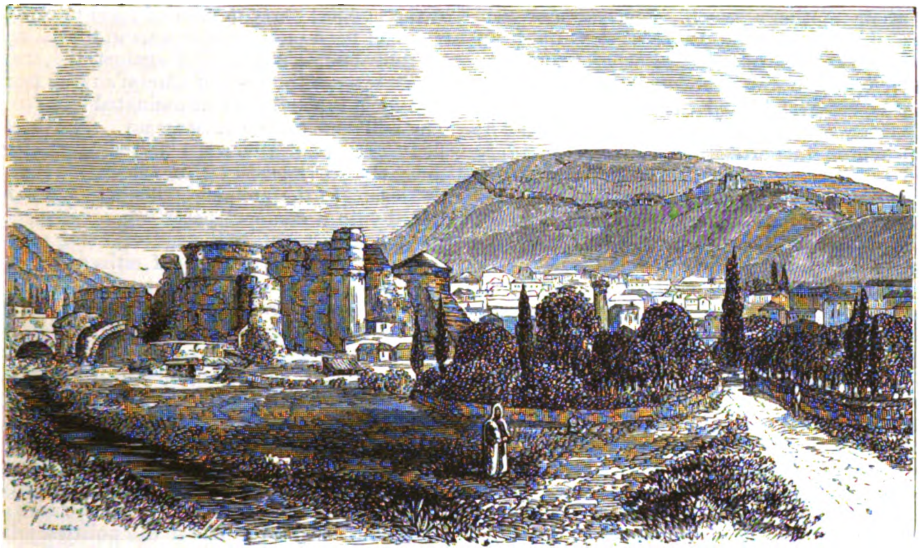
PÉREIRE, Émile and **Isaac**, French financiers of Jewish origin, born in Bordeaux, the former Dec. 3, 1800, the latter Nov. 25, 1806. Émile died in Paris, Jan. 7, 1875. They were brothers, and grandsons of Jacob Rodriguez Pereira. They removed to Paris, entered into business, and became ardent votaries of St. Simonism. They wrote for various journals, and in the *Journal des Débats* Isaac originated a daily report of the bourse. Under the guarantee of the Rothschilds they obtained the contract for building the St. Germain railway, of which Émile was the originator; and afterward under the same auspices they constructed the more important Northern railway. They built the Southern railway and the lateral canal on their own responsibility. The *crédit mobilier* was founded in 1852, chiefly through their agency, and they were afterward prominently concerned in its management. (See CRÉDIT MOBILIER.) On its dissolution in 1867, they retired also from several other companies with which they had been connected. They were both members of the legislative assembly from 1863 to 1869. Émile was distinguished as a patron of art.

PEREKOP, a town of European Russia, in the government of Taurida, and on the isthmus of its name, uniting the Crimea with the mainland, 85 m. N. by W. of Simferopol; pop. about 5,000, consisting of Russians, Armenians, Greeks, Tartars, and Jews. The isthmus, which divides the waters of the Sivash or Putrid sea, an inlet of the sea of Azov, from the gulf of Perekop, is about 18 m. long and 4 m. broad in its narrowest part. The town is situated in a barren, unhealthy district, devoid of fresh water, but its position is commercially and strategically important. The Tartars call it Or-Kapu, or Road Gate, while the Russian name, signifying trenches, is derived from an ancient line of defence traversing the isthmus, and consisting of a ditch and wall. The town, which presents a very mean appearance, is the seat of an active trade, immense quantities of salt being brought from the neighboring lakes to be distributed over the governments to the north. Perekop was formerly strongly fortified, commanding the entrance to the Crimea, and figured in the wars between the Turks and Russians. It was given up by the Porte in the treaty of Kutchuk-Kainarji in 1774, and permanently incorporated with Russia in 1783.

PEREZ, Antonio, a Spanish statesman, born at Monreal de Ariza, Aragon, about 1539, died in Paris, Nov. 3, 1611. He was a natural son of Gonzalo Perez, minister for 40 years to Charles V. and Philip II., was legitimated in his infancy, and educated at Louvain, Venice, and Madrid. On his father's death he became one of the two chief secretaries of state, and was soon the depositary of Philip's most intimate confidences. When the king wished to put out of the way Juan de Escovedo, Perez was employed to have him assassinated (1578). Escovedo was stabbed in the street by hired bravos, but it is now believed that Perez had a personal motive in causing his death, because Escovedo was acquainted with the minister's intrigue with the princess of Eboli, the king's mistress. Perez and the princess were arrested two months afterward, ostensibly to satisfy the demands of Escovedo's relatives, and the former was condemned to two years' imprisonment, eight years' exile from court, and a heavy fine. At first Philip appeared anxious to make his punishment as light as possible, but after he had obtained all the papers which might prove his own share in the murder, he sent the ex-minister to the fortress of Turreguano, and extorted from him on the rack a confession that he had killed Escovedo, coupled however with the declaration that he did it by the royal command. In July, 1590, his wife procured him the means of escape to Saragossa, where he placed himself under the protection of the *fueros* or independent jurisdiction of Aragon. The king, in violation of these constitutional privileges, ordered him to be seized, but the people forcibly released him. Philip then caused him to be transferred to the prison of the inquisition on a charge of heresy. The populace again restored him to liberty, and the consequence was an armed revolt which gave Philip a long desired opportunity to extinguish the *fueros* for ever. In the mean time Perez escaped to France, and was sent by Henry IV. on a secret mission to England, during which he published a narrative of the occurrences in which he had been concerned; but he expressed himself in a guarded and enigmatical way, which has rendered the whole affair one of the most mysterious romances of history. After the accession of Philip III. his wife and children, who had been kept in prison, were liberated (1599), but all his efforts to be recalled to Spain were in vain. Besides his *Relaciones* already mentioned, he wrote *Cartas familiares*, several political works, and a life of Philip II. which has never been printed. He wrote in remarkably idiomatic Castilian, and many of his pointed sayings have become proverbial. Much light has been thrown upon his career by M. Mignet in his *Antonio Perez et Philippe II.* (Paris, 1845; translated into English in 1846).

PERFUME, a term applied to the scent arising from odoriferous bodies, and also to these bodies themselves when they are prepared especially for the sake of their agreeable odor. The art of preparing them is called perfumery, and by the French is made to include the compounding of a great variety of articles for toilet use, as pomades, hair powders, oils, depilatories, cosmetics, dentifrices, soaps, &c., all of which are scented by the introduction of perfumes. From the most ancient times perfumes of various sorts have been held in high estimation. Solomon (Prov. xxvii. 9) remarks that "ointment and perfume rejoice the heart." They were prescribed as medicines by Hippocrates, Crito, and other ancient physicians. It is affirmed that after the destruction of the clove trees by the Dutch in the island of Ternate, the colony suffered from epidemics unknown before; and in times when the cholera has prevailed in London and Paris, those employed in the perfumery factories have escaped its ravages. The Egyptians prepared perfumes for different purposes, as for embalming the dead, as offerings to the gods, and for domestic uses. They anointed their bodies with oil, and it was the custom to pour sweet-scented oils upon the heads of newly arrived guests. In their tombs are found boxes of alabaster, onyx, glass, ivory, &c., in which the ointments were kept. One of these now in Alnwick castle contains an ointment of which the scent is still retained. The perfumes employed in embalming are also preserved in the mummies. The Egyptians obtained the materials of their perfumes, such as bitter almonds and origanum, from their own soil, and also imported perfumes from Arabia and India. In the Bible frequent reference is made to the use of perfumes by the Hebrews. The sweet incense burned upon the altar was a perfume; and "the art of the apothecary," or as some read it "perfumer," is distinctly named in Exod. xxx., where Moses is directed to prepare the oil of holy ointment from the principal spices, myrrh, sweet cinnamon, sweet calamus, cassia, and olive oil; and also to prepare a perfume of other spices named near the close of the same chapter. Other nations of antiquity, as the Phœnicians, Assyrians, and Persians, are known to have made great use of perfumes.—The art of perfumery was practised to an extraordinary extent by the ancient Greeks and Romans. The odor of perfumes was an offering to the gods, and the apparition of these was always represented as accompanied by an ambrosial fragrance. Oils, pomatums, and other perfumes were made in great profusion and most lavishly used. After bathing and in their athletic exercises the Greeks used them liberally, and it was their custom to anoint themselves twice or even thrice a day. To such an extent was this carried, that Solon enacted a law forbidding the Athenians to use them. Their wines were perfumed by infusing in them roses, violets, and hyacinths; the first step, perhaps, in the preparation of alcoholic perfumes. Capua was especially celebrated for its perfumes. One of its principal streets, called the Seplasia, was made up entirely of shops devoted to this trade; and it was also largely carried on in several other towns of southern Italy and Greece. Pliny in his "Natural History" has given a very full account of the extraordinary varieties of perfume in use by the Romans under the emperors. The perfumers (*unguentorii*) were mostly Greeks, and occupied a special quarter of the city. Their shops were supplied with aromatics from all parts of the known world, and were a favorite resort for fashionable loungers. The same taste continued under the Greek emperors. The Arabs introduced their use into Spain with many curious receipts, some of which are still preserved and are supposed to have been handed down from the Egyptians. In the middle ages France and Italy were most conspicuous for the manufacture and use of perfumes. Incense and fragrant tapers were consumed in the Catholic churches as early as the baptism of Clovis, the first Christian king of the Franks, in 496. Alcoholic perfumes are supposed to have been first made in the 14th century; and the first of these of which we have an account is Hungary water, distilled from rosemary in 1370 by Elizabeth, queen of Hungary, who obtained the receipt from a hermit, and by the use of it is said to have preserved her beauty to old age. Catharine de' Medici, when she came to France to marry Henry II., brought with her a famous Florentine perfumer named René, and from that time the French made great progress in the art; but from the receipts that have been preserved it appears that their processes were very rude and unscientific. In England a taste for perfumes appears to have been prevalent in the time of Shakespeare; and in that of Dean Swift the shops of the perfumers were the resorts of loungers, as they were in ancient Rome. But their use afterward declined.—The manufacture of perfumes is now chiefly carried on in Paris and London, and in various towns near the Mediterranean, especially in the south of France. The fruits and flowers of those sunny regions afford the greatest variety of fragrant odors, and certain towns and districts are famous for their peculiar productions; as Cannes for its perfumes of the rose, tuberose, cassia, jasmine, and the neroli, extracted from the leaves of the bitter orange; Nîmes for thyme, rosemary, aspic, and lavender; Nice for the violet and mignonette; and Sicily for the lemon, bergamot, and orange. In England some of the essential oils are prepared from native herbs on a large scale, as at Mitcham in Surrey, where a ton of peppermint and of lavender is sometimes distilled at once. In the northern United States many of the essences and essential oils are also largely prepared, the woods furnishing the wintergreen, sassafras, and other sweet-scented plants, and the gardens the peppermint, rose, &c.—Perfumes are derived from a great variety of flowers, fruits, seeds, woods, and other vegetable products; and by the skilful combining of different scents, some are obtained that imitate the odor of flowers which are not themselves used in perfumery. But it is not from plants alone that perfumes are obtained. The delicate scent of flowers has been traced to certain oils and ethers, which can be elaborated from substances associated only with the most disgusting odors. The fetid fusel oil by different methods of treatment produces oils not to be distinguished from those of various fruits; the noisome oils of gas tar are made to yield the nitro-benzole, known as the oil of bitter almonds or essence of mirbane, which is now extensively used for perfuming soap, and is even preferable for confectionery and culinary uses to the genuine article (unless this is distilled over potash), as it contains no prussic acid; and from the drainage of cow houses is extracted an essential ingredient in the famous *eau de mille fleurs*. The perfumes derived from animal sources are musk, civet, ambergris, hartshorn, &c. Ambergris, though having little scent itself, imparts a most ethereal and delicate odor to other perfumes. In an elaborate paper upon perfumery furnished by Mr. Eugene Rimmel to the society of arts of London, and published in No. 391 of their "Journal," scents in general use are classified in 18 groups, and the vegetable products used in this art are arranged in 10 divisions, as follows: 1, the floral series, viz., jasmine, rose, orange flower, cassia, tuberose, violet, jonquil, and narcissus; the attar or otto of roses (see ATTAR OF ROSES) is the most valuable product of this division; 2, the herbal series, comprising all aromatic plants, such as lavender, spike, peppermint, rosemary, thyme, marjoram, geranium, patchouli (see PATCHOULI), and winter-green, which yield essential oils by distillation; 3, the *andropogon* series, a genus of plants of this name in Ceylon, which furnish the lemon grass, citronella, and ginger grass oil; 4, the citrine series, comprising the bergamot, orange, lemon, cedrat, and limette, from whose rinds an essential oil is obtained by expression or distillation; 5, the spice series, including cinnamon, cinnamon leaf, cloves, mace, nutmeg, and pimento; 6, the wood series, consisting of sandalwood, rosewood, rhodium, cedar, and sassafras; 7, the root series, comprising orris root and vetiver, of which the latter, called by the Hindoos *kus-kus*, the root of the *anatherum muricatum*, is made in India into mats and blinds, which being often watered and exposed to the sun shed a most agreeable and lasting perfume; 8, the seed series, composed of aniseed, dill, and caraway; 9, the balm and gum series, including balsam of Peru, balsam of Tolu, camphor, myrrh, benzoin, styrax, and other gums; 10, the fruit series, including bitter almonds, Tonquin beans, and vanilla. The artificial preparations, above referred to, and the animal perfumes, make two more series. The greatest number of the materials, amounting to 28, is obtained from the south of France and Italy, which is the chief centre of manufacture for perfumery materials. The East Indies and China furnish about 21, Turkey 2, Africa 2, North America 6, South America 6, and England 4. The only articles named from the United States are peppermint, sassafras, and wintergreen. The manufacture of perfumes in the south of France is extensively carried on in the towns of Grasse, Cannes, and Nice. In Grasse about 70 establishments are engaged in this business and in distilling essential oil, and in the other two towns about 30 houses more. The principal materials used are orange and jasmine flowers, roses, violets, cassia, and tuberose. The manufactured articles consist of scented pomades and oils, rose water, and orange flower water. These do not include the essential oils, some of which are very valuable, the neroli, for instance, being worth about $50 a pound.—Several methods are in use for extracting the odoriferous properties of plants, and imparting these to spirits or oily bodies. Some of the processes are noticed in the articles EAU DE COLOGNE, and ESSENTIAL OILS. In the preparation of pomades the best fat employed is the marrow of the ox; but a cheaper fat is often substituted for it, or a mixture of beef or veal fat and lard. These are beaten in a mortar, melted in a water bath, and then strained. Before the mixture cools the essential oil selected for the perfume is stirred in; or the flowers themselves are thrown in and left to digest for several hours, when they are taken out, the fat is again heated and strained under pressure, and fresh ones are put into it; and this is continued for several days, when it is strained in cloth bags. This process is called maceration. Inodorous oils, such as the oil of behn, described by Piesse in his work on perfumery, are well adapted for taking up the perfumes of flowers by this process. Pure olive oil is largely used in the south of Europe. But for delicate plants, such as the jasmine, tuberose, and cassia, the odoriferous principle of which would be injured by the heat, the process in use is that of absorption or *enfleurage*. Square wooden boxes are provided having bottoms of glass plate. Upon these is spread a layer of purified lard and suet mixture, and upon this freshly gathered flowers are spread every morning, as long as the flower is in bloom. The boxes are kept shut, and the grease finally acquires a very strong odor. To saturate oil in the same way, the boxes have a wire bottom upon which cotton cloths soaked in the oil are laid, and the boxes or frames are piled upon each other to keep them close. When a number of cloths are charged with the perfume, they are subjected to the action of a press for recovering the oil. Spirits are scented by maceration or by digesting them with essential oils in a water bath and agitating them at times for several days. The *eau de mille fleurs* is prepared on this plan in Paris with the following ingredients and proportions: alcohol, 9 litres; orange flower water, 4 litres; balsam of Peru, 60 grammes; essence of bergamot, 120 grammes; essence of cloves, 60 grammes; essence of neroli, 15 grammes; essence of thyme, 15 grammes; essence of musk, 120 grammes. The last named essence is prepared by digesting in the heat of the sun for two months 15 grammes of civet and 75 grammes of musk in 2 litres of alcohol perfumed with ambergris. Scented vinegar is prepared in a similar way, vinegar being substituted for alcohol. Another method was discovered and introduced by M. Millon, a French chemist. He found that the aromatic principle of vegetable matters might be extracted together with some fatty or waxy matters by treating them with purified ether or sulphuret of carbon; and that by evaporating the volatile solvent at a temperature below that of the surrounding atmosphere, the perfume is retained and fixed in the residuum without undergoing any change. The substance deposited by the treatment of different plants is variously colored; it is sometimes solid, or oily or semi-fluid, becoming solid after some time. The solvent may be collected as it condenses in the distillation, and the same may be used several times over; but it should always be for the same flower, and with the same apparatus. The choicest parts of the plants or flowers are used exclusively, by which mode much more delicate results are attained than by the ordinary mode of distillation. A remarkable peculiarity of the perfumes thus prepared is that they may be kept open to the air without being dissipated and lost. They may be separated from the waxy matter by alcohol, which dissolves them together with a little of the oily and coloring matters; and in this state they may be conveniently mixed with fats and oils.—Pastilles are articles of perfumery made when set on fire to consume slowly and give out the odor with which they are charged. They are composed of charcoal finely pulverized, saltpetre, and the odoriferous substances, chiefly gum resins, the whole moulded into little cones, which are made to adhere together by the addition of mucilage. The *pastilles du sérail* consist of 24 grammes of olibanum, 24 of storax, 16 of nitre, and 124 of pulverized charcoal. For rose pastilles there are added to the above 32 grammes of rose leaves and 2 of essence of rose; for orange flower pastilles, 24 grammes of galbanum, 32 of dried pulverized orange peel, and 2 of essence of neroli; for vanilla, 24 grammes of galbanum, 16 of cloves, 32 of vanilla, 1 of essence of cloves, and 16 of essence of vanilla. Odoriferous spirits for burning are prepared in a similar way, the vanilla being generally replaced by gum benzoin.—The powdered almond paste used in perfumery is prepared from the residue of the bruised kernels of apricots or almonds, sweet or bitter, after the oil is pressed out. This is ground and sifted. The paste is variously prepared from the powder. One process is to mix together 250 grammes each of the powder and of honey, with 500 grammes of the oil of bitter almonds and the yolks of four eggs. Perfumed soaps are prepared by substituting pomade for the grease in mixture with soda lees.—See Mme. Celnart, *Nouveau manuel complet du parfumeur* (Paris, 1845; translated into English by C. Morfit, Philadelphia, 1847); Septimus Piesse, "The Art of Perfumery and the Methods of obtaining the Odors of Plants" (London, 1855); Dr. A. B. Lunel, *Guide pratique du parfumeur: Dictionnaire des cosmétiques et parfums* (Paris, 1864); Pradal and Malpeyne, "A Complete Treatise on Perfumery," translated by H. Dussauce (Philadelphia, 1864); and Eugene Rimmel, "The Book of Perfumes" (London, 1865).

PERGAMUS, or **Pergamum.** **I.** The name of the citadel of Troy, frequently used by poets for that city itself. **II.** An ancient city of Asia Minor, in the Mysian district of Teuthrania, and capital of a kingdom of the same name. It was in the delightful valley of the Caïcus, at the foot of two hills near the N. bank of that river, and at its confluence with the Cetius and Selinus, the latter of which flowed through the city. Pergamus was founded by a colony of Arcadians, or, according to other traditions, by Epidaurians under Æsculapius, who was the patron of the place. Its name is derived by some from that of Pergamus, the son of Pyrrhus and Andromache, who is said to have slain a Teuthranian king in single combat and taken possession of his territory. After belonging successively to the Persians, the empire of Alexander the Great, and the Thracian kingdom of Lysimachus, it fell into the hands of Seleucus I. of Syria. On his death (280 B. C.) it became independent under Philetærus, and extended its power and territory. Attalus I. (241-197) assumed the royal title, and through the friendly relations which he and his successor Eumenes II. (197-159) entertained with Rome, the territory was increased by that of the rest of Mysia, Lydia, Phrygia, and other neighboring provinces. Pergamus now became one of the most splendid cities of Asia, rivalling by its library, a renowned school of literature, and the invention of parchment, the principal glories of the capital of the Ptolemies. Attalus III. (138-133) ruled like a madman, and finally bequeathed his whole kingdom to the Romans, who erected it into the province of Asia, with Pergamus as the capital. It soon decayed, however, being deprived of its treasures of literature by Antony, who attached them to the library of Alexandria, and subsequently also of its dignity as capital of the province under the Byzantine rule. Here was one of the seven churches founded by St. Paul, and the city became one of the principal Asian seats of Christianity in its earliest period. It was finally destroyed during the Turkish wars.—Its site is now occupied by a flourishing town, called Bergama, noted for its manufactories of morocco leather. Among the extensive ruins are the foundations of the palace of Lysimachus and of a temple of the Corinthian order, a large Roman basilica, a double tunnel for the Selinus, remains of an amphitheatre built over the stream with arrangements to flood the arena for nautical sports, the front of a Byzantine palace, and several inscriptions. The recent researches of Ernst Curtius, Gelzer, and others have produced many valuable results.—See *Beiträge zur Geschichte und Topographie Kleinasiens* (*Ephesos*, *Pergamon*, *Smyrna*, *Sardes*), edited by Ernst Curtius (academy of sciences, Berlin, 1872).



Ruins of Pergamus.

PERGOLESI, or **Pergolese, Giovanni Battista**, an Italian composer, born in Jesi, Jan. 3, 1710, died at Torre del Greco, near Naples, March 16, 1736. He entered the Neapolitan conservatory *dei poveri in Gesù Cristo*, but left it at the age of 14, and received lessons in vocal composition from Vinci and Hasse. At 20 years of age he procured an engagement at the *teatro nuovo*, Naples, for which he wrote comic intermezzos, including the *Serva padrona*, subsequently produced with great enthusiasm at Paris. In 1734 he left Naples to become chapelmaster in Loreto, and in 1735 went to Rome, where he brought out his opera of *Olimpiade*, which was coldly received, notwithstanding it was highly commended by contemporary musicians. He renounced the drama, and returning to Loreto applied himself wholly to sacred compositions, which were better appreciated; and few works of their class have been more admired than his mass in D, containing the celebrated *Gloria in Excelsis*, and his *Dixit Dominus* and *Laudate*. Shortly before his death, his health failing rapidly, he removed to Torre del Greco, near the foot of Mt. Vesuvius. Here during his last illness he composed his cantata of *Orfeo ed Euridice*, his *Salve Regina*, and his celebrated *Stabat Mater*.

PERI. See Fairies.

PERIANDER, tyrant of Corinth, succeeded his father Cypselus probably about 625 B. C., died about 585. At first his reign was mild, but afterward it became exceedingly oppressive. Herodotus says that Periander sent to ask Thrasybulus, tyrant of Miletus, what mode of government it was safest to adopt in order to rule with security. Thrasybulus took the messenger into a corn field, and walking through it broke off and threw away all the ears that overtopped the rest. Periander thenceforth constantly depressed the power of the higher orders by putting to death or banishing prominent citizens. He suppressed common tables, clubs, and public education, shed much blood, and made exorbitant exactions. On one occasion, it is said, the women of Corinth, whom he had invited to a religious festival, were stripped by his order of their rich attire and ornaments. Aristotle speaks of him as the first who brought to a system the art of ruling despotically. His foreign policy was vigorous and successful. According to Herodotus, deceived by a scandalous report, he had put to death his wife Melissa, the daughter of Procles, tyrant of Epidaurus, though he was warmly attached to her; and when in after years his two sons visited the court of the latter, their grandfather told them the manner of their mother's death. The younger son, Lycophron, on his return refused to have any intercourse with his father; whereupon Periander sent him away to Corcyra, invaded Epidaurus, reduced it, and took Procles prisoner. His elder son Cypselus being unfit to rule, he endeavored to persuade Lycophron to return and take charge of the kingdom; and finally the latter consented on condition that his father should abdicate and live in Corcyra. But the inhabitants of Corcyra, wishing to keep Periander away, put his son to death. Periander is said to have died of grief, at the age of 80. He was usually reckoned among the seven sages of Greece, although some placed in his stead Myson of Chenæ in Laconia.

PERICARDITIS. See Heart, Diseases of the, vol. viii., p. 560.

PERICLES, an Athenian statesman, born in Athens about 495 B. C., died there in 429. He was of an ancient and noble family; his father was Xanthippus, who, with the Spartan general Leotychides, defeated the Persians at Mycale; his mother was Agariste, niece of Clisthenes, who expelled the Pisistratidæ from Athens. On the father's side he was connected with the family of Pisistratus, and on the mother's side he was descended from the princes of Sicyon and the Alcmæonidæ. He was instructed by Damon, Zeno, and Anaxagoras, with the last of whom he was intimate. In 469 he began to take part in public affairs, and soon became the leader of the popular party, as Cimon was of the aristocracy. When the Messenians rose against Sparta in 464, and fortified themselves on Mt. Ithome, the Spartans invoked the aid of the Athenians to reduce the place. Cimon was sent with a large force; but he failed to reduce the fortress, was slighted by the Spartans, and returned home in disgrace. Between Pericles and Cimon there was a hereditary feud; for it was Xanthippus, the father of Pericles, who had impeached Miltiades, the father of Cimon. Taking advantage of the unpopularity which the ill fortune at Mt. Ithome brought upon Cimon and the aristocracy, Pericles caused a measure to be carried in the popular assembly, by which the court of the areopagus was nearly shorn of its political power. This was a fatal blow to the aristocracy, and constituted, with other changes, a political revolution. Among these changes were the institution of dicasteries or jury courts, in which jurors were paid for their attendance, and the almost complete abrogation of the judicial power of the senate of 500. The ascendancy of Pericles and the popular party thus established cost many a violent struggle. The poet Æschylus enlisted all his powers, in the drama of the "Eumenides," against these innovations; but his opposition resulted only in his own flight from the city, while Cimon himself, who had before narrowly escaped banishment, was soon after driven into exile by ostracism (about 459). On the other hand, Ephialtes, a leader with Pericles of the popular party, a man of rigid integrity, who had been most conspicuous in the passage of the obnoxious measure against the areopagus, was, at the time of Cimon's recall from banishment (about 454), assassinated by a Bœotian emissary of the aristocracy. The humbled aristocracy afterward united themselves under the party lead of Thucydides, the son of Melesias. In the popular assembly they were drilled into a compact party organization, occupying seats together instead of being mixed up with the general mass of citizens. They complained of the administration of Pericles, that the fund derived from the confederacy of Delos, intended for purposes of general defence against the Persians, had been misapplied in the adornment and strengthening of Athens. Pericles claimed the right to use in this way so much of the public treasure as was not needed for the common defence. He was sustained, and Thucydides driven into banishment. This annihilated the aristocratic party, and left to Pericles the undisputed conduct of affairs. He had succeeded to the political principles of Themistocles, and he labored first to make Athens the capital of Greece, the centre of political power and influence, and the seat of art and refinement; and secondly to elevate the public spirit of his countrymen. He gave respectability and value to the elective franchise by setting close guards against a fraudulent abuse of it, and thus made even the humblest citizen feel something of the dignity of Athenian citizenship. He trained the people to naval affairs by sending out every year a squadron of 60 triremes to cruise for eight months in the Ægean. He planned great architectural works to embellish and strengthen the city. He built the Odeon for theatrical exhibitions, and the Parthenon with the Propylæa. To render secure the communication of Athens with the sea, chiefly through his advice, the long walls had been built to the Piræus and Phalerum; and to increase this security he added a third wall, and improved and beautified the Piræus. He further provided for the poorer classes and strengthened the state by an enlightened system of colonization. For the entertainment of the people he added to the pomp and magnificence of popular spectacles, established new ones, and made the theatres and public festivals accessible to the poorer classes. He democratized the legislative and judicial functions of government by paying jurors and legislators. Literature, architecture, painting, and sculpture rose under him to the highest perfection. In his foreign policy he aimed at the aggrandizement of Athens and the extension and consolidation of her sway. Beginning as an ally, he in a few years reduced a portion of the confederate states to the condition of tributaries, and bound the rest to military service and a conformity of foreign policy. Upon each of the subject states he imposed a democratic form of government, and transferred important trials from the local courts to the tribunals of the capital. The annual tribute or contribution to the confederate fund, the custody of which had already been transferred from Delos to Athens, he raised from 460 talents ($500,000) to 600 talents, although the object of its establishment, namely, to resist a Persian invasion, no longer occupied the public mind. During his administration, 1,000 Athenians were settled in the Thracian Chersonese, 500 in the island of Naxos, and 250 in the island of Andros. He appropriated the Greek city of Sinope, on the shores of the Euxine, for the maintenance of 600 Athenian citizens. The islands of Lemnos, Imbros, and Scyros, together with a large tract in Eubœa, were covered with Athenian proprietors. Colonies were planted at Thurii in Italy, near the site of the ancient Sybaris, and at Amphipolis on the Strymon. To the former foreigners were invited from all parts of Greece. The overshadowing influence of Pericles made him an object of envy, jealousy, and hatred. His public and private life were both in turn assailed. When the Peloponnesian war impended, the hostile faction excited the public mind against him to a dangerous pitch. But his influence continued predominant. An attempt, instigated by the Lacedæmonians, was made to sacrifice him on account of a taint of sacrilege in his family (see ALCMÆONIDÆ), but it failed. His enemies tried to wound him through his friends. Anaxagoras, the philosopher, was indicted for impiety and banished. Aspasia was included in the same charge, but the eloquence of Pericles moved the dicastery to acquit her. Scandals were propagated to sully his character in connection with this remarkable woman. (See ASPASIA.) Unable to ruin his reputation, his enemies attacked him through his friends. Phidias was unsuccessfully indicted for embezzlement, and subsequently for impiety in having introduced among the figures on the shield of his statue of Athena portraits of himself and of Pericles, for which he was imprisoned. In the first campaign of the Peloponnesian war Pericles was denounced for his defensive policy; in the second campaign he took command of a fleet and devastated the coast of the Peloponnesus. On his return he was charged with peculation, fined, and deprived of his command, but soon afterward was reëlected general. The plague carried off many of his friends, his sister, and his sons Xanthus and Paralus; but, either by the repeal of the law respecting legitimacy which was adopted by his influence, or by a special vote, his son Pericles by Aspasia was legitimated. Pericles fell a victim to the prevailing epidemic about a year afterward. When dying, he reminded those who stood about his bed, recounting his deeds, "that not a citizen of Athens had been obliged to put on mourning on his account." Plato extols his "majestic intelligence," and Thucydides describes him as "powerful from dignity of character as well as from wisdom." —See "The Age of Pericles," by W. Watkiss Lloyd (2 vols., London, 1875).

PÉRIER. **I. Casimir,** a French statesman, born in Grenoble, Oct. 21, 1777, died in Paris, May 16, 1832. He was a son of one of the founders of the bank of France, and retired from the army to join his brother in banking, which made him rich and influential. In 1817 he was elected to the chamber of deputies, and became one of the most conspicuous leaders of the opposition. After vainly attempting to avert the revolution of 1830, he was made a member of the provisional executive committee and president of the chamber. He was the recognized leader of what Guizot called "the middle class tory party" (*juste-milieu*), and succeeded Laffitte, March 13, 1831, as Louis Philippe's prime minister. He energetically opposed all revolutionary movements and needless intervention in foreign affairs, though his administration was marked by the expedition to Antwerp in behalf of Belgian independence, to Portugal for the overthrow of Dom Miguel, and to Ancona to check Austria. He fell a victim to the cholera, on its first appearance in France. Charles de Rémusat wrote a notice of his life appended to *Opinions et discours de Casimir Périer* (4 vols., Paris, 1838). **II. Auguste Casimir Victor Laurent** (who changed his surname in 1873 to CASIMIR-PÉRIER), a French statesman, son of the preceding, born in Paris, Aug. 20, 1811. He spent 14 years in the diplomatic service, was a deputy from 1846 to 1848, and a member of the legislative assembly from 1849 to Dec. 2, 1851. In September, 1870, the Germans arrested him at his country seat, and detained him till February, 1871. On the 8th of that month he was elected to the assembly as a partisan of Thiers, and displayed much ability in financial legislation. He was minister of the interior from Oct. 11, 1871, to Feb. 2, 1872, when he retired on account of the opposition to the removal of the assembly to Paris; he resumed the office in May, 1873, but after a few days he withdrew with Thiers. In 1874 he proposed a constitutional bill, which was rejected by the assembly, July 24. He has published numerous works on financial and political questions, and one on Charlotte Corday, with new documents.

PERIGEE (Gr. περί, about, and γῆ, earth), the opposite of apogee, and, as commonly understood, that point of the orbit of the moon where she is nearest the earth. The term is also sometimes used to denote that point of the orbit of the earth where it is nearest the sun; the sun is then said to be in perigee. It is also used in old treatises on astronomy to signify the least distance of a planetary body from the earth.

PÉRIGORD, an ancient division of S. W. France, in Guienne, mainly included in the modern department of Dordogne. It was divided into Upper and Lower Périgord, of which Périgueux and Sarlat were the capitals. It became a county in the 8th century, and was united to the crown by Henry IV.

PÉRIGUEUX (anc. *Vesunna*), a town of France, capital of the department of Dordogne, and formerly of the county of Périgord, on the right bank of the Isle, which is here crossed by a magnificent bridge, 67 m. E. N. E. of Bordeaux; pop. in 1872, 21,864. It is composed of the old town and Le Puy St. Front, which until 1240 was a separate town. It is the seat of a bishop, of a civil and commercial tribunal, and of a society of agriculture and fine arts. It has four churches, four religious communities of men and six of women, a primary normal school, a communal college, a museum for antiquities and mineralogy, and a library of about 16,000 volumes. There are manufactures of cutlery and nails, woollens, and leather, and a brisk trade in wood, iron, paper, and liqueurs.—The ancient Vesunna was originally the capital of the Gallic tribe of Petrocorii, from which the modern name is derived. There are numerous and remarkable Roman remains.

PERIHELION (Gr. περί, about, and ἥλιος, sun), that point of the orbit of a planet or a comet where it is nearest to the sun. The distance of this point from the sun is called the perihelion distance of the body. It is opposed to aphelion.

PERIM (Arab. *Mehun*), an island belonging to Great Britain, in the strait of Bab-el-Mandeb, at the entrance of the Red sea, about 90 m. W. of Aden; area, 7 sq. m.; pop. in 1871, 211. It divides the strait into two channels, called respectively the Great and the Little strait. The former, between Perim and the coast of Africa, is about 13 m. wide, but its navigation is made dangerous by a group of volcanic islets called the Eight Brothers. Vessels to and from the Red sea usually pass through the smaller strait between the island and Cape Bab-el-Mandeb on the coast of Yemen, which is 1½ m. wide. Perim is a rocky truncated cone of volcanic origin, about 230 ft. above the level of the sea in its highest part, and is almost destitute of vegetation and without water. On the S. W. side is an excellent harbor with a depth of seven fathoms, capable of holding 40 men-of-war. On the highest part of the island is a lighthouse, erected in 1861, and on Straits point are fortifications which command the narrow channel.—Perim was anciently called *Diodori Insula*. It was first occupied by the British in 1799, under the belief that Napoleon, who was then in Egypt, contemplated a descent on India, but it was abandoned in 1801. The project of the Suez canal again brought it into importance as commanding the new route to India, and it was again occupied formally on Feb. 14, 1857. It is under the jurisdiction of the governor of Aden.

PERIODICAL LITERATURE, as the term is usually applied, comprises those serial publications the principal object of which is not the conveyance of news, but the circulation of interesting essays, tales, poems, and literary, scientific, or artistic information. Periodical literature embraces two classes of publications, the first devoted to literature or criticism, and the second to the sciences, the arts, or special branches of knowledge. Many present characteristics which would place them in both of these divisions.—The multiplication of books rendered it impossible for the scholar to purchase or peruse more than a small portion of the works issued from the press; hence the necessity for critical journals. This want was first met in France. In January, 1665, Denis de Sallo, assuming the name of the sieur d'Hédouville, issued at Paris the first number of the *Journal des Savants*. He was succeeded in the following year by the abbé Jean Gallois, under whose supervision the journal was published at irregular intervals till 1672. Its publication was resumed by the abbé J. P. de la Roque in 1675, who was followed by L. Cousin in 1687. In 1701 it was placed under the protection of the chancellor of France, and a commission of learned men appointed to conduct it. It was interrupted by the revolution at the close of 1792, and an effort to revive it in 1797 was only so far successful that a volume of 394 pages was published; it was permanently reëstablished in 1816, and still continues. J. Doneau de Visé founded in 1672 the second literary periodical in France, the *Mercure galant*, which gave reviews of poetry and the drama. Its title was changed in 1717 to the *Mercure de France*, and it was conducted with ability by Marmontel and others till 1813. It has since been revived for brief periods as the *Minerve française* (1818–'20) and the *Mercure du XIX*^{e} *siècle*. In 1701 a society of Jesuits at Trévoux began the *Mémoires pour servir à l'histoire des sciences et des beaux-arts*, more commonly known as the *Mémoires de Trévoux*. It was characterized by the excellence of its critical judgments, and by the zeal with which it combated anti-Jesuitical opinions; it lasted till 1767. A virtual successor of the *Mémoires* is the existing periodical of the society of Jesuits, the *Études de théologie, philosophie et histoire*, at first published annually (1857 and later), then semi-annually, afterward quarterly, and since 1863 fortnightly. It is conducted by Gagarin, David, and De Guilhermy. The other noteworthy literary journals of France in the last century were the *Année littéraire* (1754–'91) of Fréron; the *Décade* (afterward *Revue*) *philosophique* (1794–1807), by Ginguené; and the *Magasin encyclopédique* (1795), by Millin, the second series of which was styled *Annales encyclopédiques*, and the third *Revue encyclopédique*. It was suspended in 1832, when it was succeeded by the *Revue française et étrangère*, by Jullien, of which only a few volumes were issued; and a second attempt by Didot to reëstablish it in 1846 as the *Nouvelle Revue encyclopédique* was equally unsuccessful. In the present century the *Revue française* (1828–'30 and 1837–'9), by Guizot, the *Revue de Paris* (1829–'46), the *Revue indépendante*, and many more have appeared and been discontinued. But the *Revue des Deux Mondes*, commenced in 1829, among whose most celebrated contributors have been Sainte-Beuve, Rémusat, Thiers, De Broglie, Edmond About, George Sand, Caro, Renan, and a great number of other leaders in French literature, has been marked by an ability which has made it permanent and placed it at the head of French critical serials. To the admission of poetry and tales into the reviews, and to the publication by almost every newspaper of a literary *feuilleton*, must be ascribed the almost total want in France of serials exactly corresponding to the English magazines.—England seems, with the exception of Italy, to have been the first country to imitate the example of France. But the "Weekly Memorials for the Ingenious," the earliest issue of which appeared in January, 1682 (1681–'2), lasted but a year, and some of its articles were translations from the *Journal des Savants*. The "Universal Historical Bibliothèque" began in January, 1686, and expired in March. The "History of Learning" (1691, and again 1694), and the "Memoirs for the Ingenious" (1694), were also of brief duration; but the "History of the Works of the Learned" (1699–1711) was more successful, though the works reviewed are chiefly continental. A learned French Protestant refugee, Michel de la Roche, edited in London the "Memoirs of Literature" (1709–'14), and afterward in Holland the *Bibliothèque angloise* (1717–'27) and the *Mémoires littéraires de la Grande-Bretagne* (1720–'24); but his "Memoirs of Literature" was recommenced in England in 1725. In 1728 the title was changed to the "Present State of the Republick of Letters," and Andrew Reid assumed the editorship. It underwent another transformation in 1737, becoming the "History of the Works of the Learned," which was continued till 1743. Its place was then to some extent supplied by the "Literary Journal" (Dublin, 1744–'9), the earliest publication of the kind in Ireland. Since the middle of the 18th century it has been generally customary in English literature to apply the word review to those serial publications whose province is criticism, and magazine to those whose pages are filled with miscellaneous and entertaining reading. The earliest of the former class was the "Monthly Review" (1749–1844), established by Griffiths, who conducted it for more than half a century. It was followed within the next 50 years by the "Critical Review" (1756–1817), founded by A. Hamilton and supported by the contributions of Smollett, J. Robertson, and other writers; the "London Review" (1775–'80), succeeded by the "New Review" (1782–'96), a journal incorporated in 1797 with the "Analytical Review" (1788–'99), which was driven from the field by the "Anti-Jacobin Review and Magazine" (1798–1821); and the "British Critic" (1793–1843), edited at first by Nares and Beloe, who advocated the principles of the English high church party. At the beginning of the 19th century the "Edinburgh Review" (founded in 1802 by Francis Jeffrey, Sydney Smith, Henry Brougham, Francis Horner, and others) at once elevated the standard of this class of serial literature. It met with immediate and great success, and from the beginning numbered among its contributors many of the leaders in English literature. Macaulay, Carlyle, and later Sir William Hamilton, have been among the chief of these. It was a vigorous defender of whig policy, and soon had a formidable rival in the tory "Quarterly Review" (1809) of London, successively edited by Gifford, J. T. Coleridge, and Lockhart, and numbering among its contributors Scott, Southey, and Croker. The "Westminster Review" (1824), styled for a period the "London and Westminster Review," was started by Bentham and other utilitarians, and, as the organ of the radicals in politics, has maintained a high position under the direction of Bowring, Mill, and Hickson. The "Eclectic Review" (1805), in which papers by Adam Clarke, Robert Hall, and John Foster appeared, was evangelical in religion and liberal in politics; the "Christian Observer" (1802), at first edited by Z. Macaulay, C. Wilks, and others, is the organ of the moderate church party; and the "Dublin Review" (1836) was brought into existence by O'Connell and his friends as the representative of Catholic literature. Many able reviews, of considerable influence during their continuance, have ceased to exist. Such are the "Foreign Quarterly Review" (1827–'46), which occupied itself, under the editorship of Gillies and Fraser, with foreign literature; the "British Review" (1811–'25); the "Retrospective Review" (1820–'26, and again 1853), which gave reviews of old books; and the "Irish Review" (1857). Their places have been filled by the "British Quarterly Review" (1845), successor to the "British and Foreign Review" (1835–'45), the "New Quarterly Review" (1852), the "Scottish Review" (1853), the "London Review" (1853), the "National Review" (1855), and a few others. The reviews are generally printed quarterly, but the "Saturday Review" (1855), which combines political articles with critical notices of new publications, is a successful weekly; while the "Examiner" (1808), "Athenæum" (1828), "Spectator" (1828), and "Illustrated Review" (1873) are also hebdomadal journals of criticism, giving a portion of their space to literary intelligence. The "Fortnightly Review" (which retains its original name, though now published monthly) and the "Academy" (fortnightly) have the same general arrangement; the former of these publications being especially influential, and numbering among its past and present contributors, besides the editor John Morley, J. S. Mill, Mazzini, William Morris, Swinburne, Francis Galton, and many others.—The "Tatler" (1709–'10) and "Spectator" (1711–'12 and '14) traced out a new path in literature, in which many imitators, not only in England, but all over the continent, hastened to follow. Of the multitude of similar English publications, the "Rambler" (1750–'52) of Johnson was the most famous. The earliest of the English magazines was the "Gentleman's Magazine," commenced in London by Cave in 1731, and continued after his death by Henry and Nichols, the editors assuming the pseudonymous appellation of Sylvanus Urban. Johnson and other eminent writers of the 18th century contributed to it; besides sketches and essays, it published for a time the proceedings of parliament; and it contained obituaries and much other historical matter, which has been made accessible by the publication of five index volumes. It is still continued. For many years its pages were almost wholly devoted to history and archæology; but these features have almost disappeared, and it has become lighter and more general than ever before, changing its character completely. Cave had a host of followers. The "London Magazine" (1732–'84), the "Royal Magazine" (1759–'71), the "Oxford Magazine" (1768–'82), the "European Magazine" (1782–1826), the "Scots Magazine" (1789-1817), the earliest in Scotland, and the "Monthly Magazine" (1796–1829), supported by the efforts of Priestley, Godwin, and others, were among the chief ones which originated in the 18th century. "Blackwood's Edinburgh Magazine" (1817) is of a higher order than any of its predecessors. Founded by Blackwood, the Edinburgh publisher, who was long its editor, and supported by the constant contributions of John Wilson ("Christopher North"), J. G. Lockhart, James Hogg, Dr. Maginn, Robert Syme, and others associated with them, it attained an early fame, which has since been sustained by the writings of some of the greatest English authors. The "New Monthly Magazine" (1814), edited in turn by Campbell, Hood, Bulwer-Lytton, and Ainsworth, "Fraser's Magazine" (1830), and the "Dublin University Magazine" (1832), have been leaders among those which followed "Blackwood's." A new era in this sort of literature has been introduced by the shilling magazines, of which "Macmillan's Magazine" (1859), the "Cornhill Magazine" (1859), first edited by Thackeray, and "Temple Bar" (1860), by Sala, are the most prominent, the last two having attained a very large circulation. The "St. James's Magazine," "Belgravia," "St. Paul's," and "London Society" are recent additions to this class. The weekly magazines began in 1832 with the "Penny Magazine" (1832–'45) of Knight, and "Chambers's Journal." The former was not only very successful, owing to its illustrations and its cheapness, but it led to a crowd of imitations both in Europe and America. This popular class of journals, including the "Saturday Magazine" and "Family Herald," has of late been greatly improved, and other examples of the kind are "Howitt's Journal" (1847–'9), "Household Words" (1850–'59), conducted by Dickens, "All the Year Round" (1859), by the same editor and continued by his son, "Once a Week" (1859), the "Leisure Hour" (1861), and many others. A peculiar department in periodical literature has been marked out and filled since 1849 by "Notes and Queries," which forms a medium of intercommunication for men of letters, and a repository for brief notes on curious topics in the various branches of literature. Many of the English magazines have within a few years adopted pictorial illustration; and a great many illustrated publications occupy a kind of middle ground between the magazines proper and the newspapers. Such are the "Graphic," a London illustrated weekly, the "Illustrated London News," and many others.—In Germany a translation of the *Journal des Savants* appeared at an early day, but in 1682 an original work, the *Acta Eruditorum*, was founded by two private learned societies at Leipsic. It was less brilliant, although by no means less erudite, than its French prototype; but being written in the Latin language, sternly orthodox in its Lutheran opinions, and governed by no systematic code of criticism or philosophy, it failed to exert the influence or attain the success of the Paris periodical. Supported by the contributions of men like Leibnitz, Seckendorf, and Cellarius, it continued for a century. The first literary serials in the German language were written in the form of dialogues; they were the *Monatsgespräche* (1688–'9) of Thomasius, and the *Monatliche Unterredungen* (1689–'98) of Tenzel, who subsequently edited the *Curieuse Bibliothek* (1704–'7). The *Novellen aus der gelehrten und curieusen Welt* (1692) had but a brief existence, and the *Deutsche Acta Eruditorum* (1712–'56), an imitation of the Latin work, was the first really successful undertaking of the kind. Under the title of *Gelehrte Zeitung*, almost every large town had in the latter half of the 18th century its literary journal, among the principal being those of Frankfort, Halle, Kiel, Gotha, Erfurt, and Erlangen. But more important were the *Neue Zeitung von gelehrten Sachen* (1715–'97), edited by Beck and others, whose closing volumes are entitled *Literarische Denkwürdigkeiten;* the *Göttinger gelehrte Anzeigen*, begun in 1739 as the *Zeitung von gelehrten Sachen*, whose editors, among others, have been Haller, Heyne, and Eichhorn, and which is still published; the *Allgemeine Deutsche Bibliothek* (1766–1806), founded by Nicolai; the *Briefe, die neueste Literatur betreffend* (1759–'65), in which Lessing, Mendelssohn, and Abbt took part; the so-called *Bremer Beiträge*, through whose pages Gieseke, Zachariä, Gellert, Gärtner, and other critics exercised a powerful influence upon the German literary world; the *Allgemeine Literaturzeitung*, established by Bertuch at Jena in 1785, but removed by Schütz to Halle in 1804, and continued till 1848; and the *Jenaische allgemeine Literaturzeitung*, founded by Eichstädt at Jena upon the removal of the last named, and also suspended in 1848. In the earlier half of this century were published the *Leipziger Literaturzeitung* (1800–'34), the *Wiener Jahrbücher der Literatur* (1818–'48), *Hermes* (1819–'31), distinguished for its erudition, and the *Jahrbücher für wissenschaftliche Kritik* (1827–'47). The leading existing critical authorities are the *Heidelberger Jahrbücher der Literatur* (1808); the *Repertorium der deutschen und ausländischen Literatur* of Gersdorf, a continuation of the *Repertorium der gesammten Literatur* (1834–'43); the *Deutsche Vierteljahrsschrift* (1838), modelled upon the English quarterlies; the *Gelehrte Anzeigen* of the Bavarian academy; the above mentioned Göttingen periodical of the same name; *Das Ausland* (1828); the *Literarisches Centralblatt für Deutschland; Die Gegenwart* (1872); the new *Literaturzeitung* of Jena (1874); the *Deutsche Rundschau* (1874), and one or two others. Of a lighter and more popular tone are the *Blätter für literarische Unterhaltung* (1833), previously edited by Kotzebue as the *Literarisches Wochenblatt;* the *Deutsches Museum* (1851), by Prutz and Frenzel; the *Grenzboten* (1841), by Schmidt and Freytag; *Westermann's Monatshefte* (1855); the *Gartenlaube* (perhaps the best known), *Der Salon*, and many more of the magazine kind. The *Illustrirtes Familien-Journal* of Leipsic is of the "Penny Magazine" school, and enjoys a very large circulation. *Ueber Land und Meer*, and other weekly illustrated periodicals, are of much the same character as the London "Graphic."—In 1668, three years after the appearance of Sallo's journal, the *Giornale de' Letterati* was commenced at Rome by Nazzari, and published till 1679. Under the same title literary periodicals were afterward issued at Parma (1686–'90) by Roberti and Bacchini, at Venice (1710–'33) by the brothers Zeno, at Florence (1742), and finally at Pisa in 1771, which last has been continued, with the exception of a brief period (1797-1801), down to our own time. The *Biblioteca volante* (1676–1718, and 1733–'47), commenced by Cinelli and continued by Sancassani, was less solid; but the *Novelle letterarie*, published for several years subsequent to 1740, and edited in part by Lami, was marked by much erudition. Distinguished at a later period have been the *Biblioteca italiana* (1816–'40) of Milan, conducted at first by Acerbi; the *Antologia* (1821-'32) of Florence, under the direction of a society of scholars; the *Giornale arcadico* (1819) of Rome, begun by Odescalchi; the *Giornale enciclopedico* (1806) of Naples, which was followed in that city by the *Progresso delle Scienze* (1833–'48), and since by the *Museo di Scienze e Letteratura;* and several minor ones, like the *Poligrafo* (1811), and *Magazzino pittoresco*, and the popular *Album* (1824) of Rome. The *Rivista contemporanea* of Turin, founded in 1852, flourished for several years. The *Politecnico* (1839) of Milan was suppressed in 1844 and revived in 1859; and there are at present several periodicals of literary and scientific interest. Including the proceedings of learned societies, and several illustrated weeklies, such as the *Illustrazione*, *Gazetta illustrata di Roma*, &c., more than 30 periodicals are now (1875) published in Rome, the number having rapidly increased since the events of 1870.—Spain was represented in periodical literature during the 18th century by the *Diario de los Literatos* (1737-'47); the *Pensador* (1762), one of the "Spectator" school, and chiefly written by Clavijo; the *Seminario erudito* (1778–'91), by Balladeres, noted for its publication of rare and important literary manuscripts; the *Memorial literario* (1784–1807); and the *Variedades*, which acquired a considerable reputation under the management of Quintana. The *Crónica científica y literaria* (1824), by Mora, subsequently became a political sheet. The *Censor* (1820), by Lista, Hermosilla, and Miñano, was for some years the best periodical which Spain had seen; this was finally superseded by the *Revista española* (1831), which successively changed its title to *Revista europea* and *Revista de Madrid*. Later are the *Cartas españolas* (1831), the *Antología española* (1848), the *Revista hispano-americana* (1848), edited by Mora for a brief period only, the *Revista de España*, the *Seminario pintoresco*, and the *Revista de Ambos Mundos.*—The *Jornal da Coimbra* in the earlier part of this century was the first, and for a long time the only, literary organ of Portugal. In 1837 the *Panorama* was founded, which still circulates largely both in Spain and Brazil; and in 1842 the very excellent *Revista universal lisbonense* was established by Castilho. Other publications of the literary class are the *Jornal da Sociedade dos Amigos das Letras* and the *Bibliophilo.*—In Holland two celebrated men entered upon the career of literary journalism in the latter part of the 17th century. The *Mercure savant* (1684) of Desbordes at Amsterdam was a feeble production; but Bayle in the same year began his *Nouvelles de la République des Lettres*, which was continued with great success till 1718. He speedily found a rival in Le Clerc, who undertook in 1686 the first of the three famous series of reviews to which he is indebted for so much of his reputation. These were the *Bibliothèque universelle et historique* (1686–'93), the *Bibliothèque choisie* (1703–'13), and the *Bibliothèque ancienne et moderne* (1714–'27). The first periodical in the vernacular was the *Boekzaal van Europa* (1692–1708, and 1715–'48), by Rabus and Sewel, which was excelled by the *Republijk der Geleerden* (1710–'48). J. van Effen, imitating the English essayist, produced his *Hollandsche Spectator* (1731–'5) with marked success; but a new era in criticism was introduced in 1761 by the *Vaderlandsche Letteroefeningen*, which still continues. The *Allgemeene Kunst- en Letterbode* (1788) maintained for many years a high rank, but now exerts little influence. The *Recensent* (1803), superseded within the past 20 years by the *Nieuwe Recensent*, has proved a powerful rival to the *Letteroefeningen*. Other existing periodicals are the *Nederlandsche Museum* (1835), the *Tijdstrom* (1859), and the *Navorscher* on the plan of the London "Notes and Queries."—The *Esprit des Journaux* (1772–1818) was a Belgian literary miscellany of considerable value; but it was not until the separation from Holland that the periodicals of Belgium began to be of much interest. The *Messager des Sciences*, edited for many years by St. Genois, is frequently quoted, while the chief issues in the Flemish tongue have been the *Nederdeutsche Letteroefeningen* (1834), by Blommaert; the *Belgisch Museum* (1836–'46), by the well known scholar Willems; the *Kunst- en Letterblad* (1840–'43); the *Vlaemsche Rederyker* (1844), and one or two more popular miscellanies.—In Switzerland the *Bibliothèque britannique* (1796–1815), and its more original successor the *Bibliothèque universelle* (1816), which is published in two parallel series, one scientific and the other literary, are widely circulated both at home and abroad. The *Revue suisse* has been conducted with much success at Neufchâtel since 1837.—The earliest noteworthy literary journal of Denmark was the *Lærde Tidende* (1749–'66). Then came the *Minerva* (1785) of Rahbek, continued with a slight change of title till 1819; the *Danske Tilskuer* (1791–1808); the *Skandinavisk Museum* (1798–1803), revived as the *Litteratur-Selskabs Skrifter* (1805–'32); and the *Lærde Efterretninger* (1799–1810), by Müller, ably continued by the same editor under the name of *Litteratur-Tidende* (1811–'36). Molbech published the *Athene* (1813–'17) and other periodicals, one of which, the *Historisk Tidskrift* (1840), survived him, and was afterward edited by Westergaard. The more modern journals are the *Tidskrift for Litteratur og Kritik* (1839–'42), now transformed into the quarterly *For Litteratur og Kritik* (1843); *Maanedskrift for Litteratur* (1829–'38); the *Nordisk Litteratur-Tidende* (1846); *Nord og Syd* (1848–'9), by Goldschmidt, revived in 1856, and afterward changed to the *Hjemme og Ude*; and the *Dansk Maanedskrift*, by Steenstrup, commenced in 1858. In 1854 the *Nordisk Universitets Tidskrift*, a well managed quarterly review, of which the numbers are alternately published in Swedish and Danish by the four Scandinavian universities of Copenhagen, Christiania, Upsal, and Lund, originated in the Danish capital. The *Svenska Argus* (1732–'4), written by Dalin, a warm admirer of Addison, was the earliest notable addition made by Sweden to learned periodical literature. In 1742 Celsius founded the *Tidningar om den lärdas Arbeten*, which was afterward edited by Salvius and Gjörwell as the *Lärda Tidningar*; but the first comprehensive critical journal was the *Svenska Mercurius* (1755–'65) by Gjörwell. The *Phosphoros* (1810–'13), by Atterbom and Palmblad, carried on by the latter as the *Svensk Literatur-Tidning* (1814–'24), and its adversary the *Iduna* (1811–'24), edited by a society styled *Göthiska Förbundet*, both wielded a powerful influence in the literary circles of Sweden, and originated two different schools of poetry and criticism. Among other periodicals may be mentioned *Polyfem* (1810–'12); *Svea* (1818–'32), noticeable for its elevated tone and clever reviews of foreign books; *Journal för Literaturen* (1809–'13), subsequently known as the *Allmänna Journalen* (1813–'23); *Skandia* (1833–'7); *Literatur-Foreningens Tidning* (1833–'6); and the *Literaturblad* (1838–'40). The best of a later date are the *Tidskrift för Literatur* by Malmström (1850), the *Nordisk Tidskrift*, by Solman (1852), and *Förr och Nu*, published at Stockholm, and now the leading monthly. A Swedish monthly, the *Augustana*, is published at Chicago, U. S. *Nor* (1840–'46), conducted by members of the Christiania university, and the *Norsk Tidskrift for Videnskab og Litteratur*, established in 1847, and since edited by Lange, are the only especially prominent literary organs which have yet arisen in Norway. The periodicals published in the Icelandic language are not numerous. They comprise the *Sagnablöd* (1817–'26), edited by Finn Magnusson, and now issued under the name of *Skirnir* (1827); *Fjölnir* (1835–'45); *Ny Fjelagsrit* (1841), a review edited chiefly by Jon Sigurdsson; and *Nordurfari* (1848–'9), by Gisli Brynjulfsson. In Finland the sole literary journal deserving of notice is the *Suomi*, which has been issued in the Swedish language since 1840.—The existing periodicals of Russia are more noted for their size than their number, a single issue sometimes containing 300 pages. Periodical literature in that country began with the *Yezhemiesiatchniya sotchineniya* ("Monthly Essays"), edited by Müller from 1755 to 1764. Soon afterward commenced Sumarakoff's "Industrious Bee" (1759), and Kheraskoff's "Leisure Hours" (1762). The *Viestnik Evropi* ("European Intelligencer"), founded in 1802 by the historian Karamsin, and subsequently (1808) edited by Zhukovsky, was superior to these. To this succeeded the *Ruskoi Viestnik*, conducted from 1808 to 1820 by S. N. Glinka, then by Gretch and Polevoi, which, after being suspended for some years, was revived at Moscow in 1856 by Katkoff. One of the ablest publications was the *Sin Otetchestva* ("Son of the Fatherland"), founded in 1812, with which was united in 1825 the *Severnoi Arkhiv* (1822), or "Northern Archives," at which time Bulgarin and Gretch became joint editors; the latter resigned it in 1839 into the hands of Massalsky, and a few years afterward it ceased to appear. The "Telegraph" of Moscow (1825–'35), by Polevoi, began a new era in Russian criticism; it was suppressed by the government, and its successor, Nadeshdin's "Telescope," speedily met with a similar fate. They were followed in the old capital of Russia by the *Moskvitanin* (1840), founded by Pogodin, the organ of the Panslavic theories. The *Biblioteka dlia Tchteniya* ("Library for Reading") owed its origin (1834) to Gretch, who was followed in the chair of editorship by Senkovsky; under the direction of Smirdin it is still one of the foremost periodicals of the country, although a portion of its contents consists of translations, chiefly from English works. The *Sovremennik* ("Contemporary"), founded by Pushkin in 1836, was afterward conducted by Pletneff; while the *Otetchestvenniya Zapiski* ("National Journal") was edited at first (1840) by Bielinsky, and then by Krayevsky, distinguished under both by the zeal with which it opposed Panslavism. Outside of the country itself the *Archiv für wissenschaftliche Kunde von Russland*, edited at Berlin by Erman since 1841, gives a valuable *résumé* of the labors of the Russian men of science and letters.—An important Polish periodical was edited before the revolution of 1830 by Lach Szyrma under the title of *Pamiętnik warszawski* ("Warsaw Memoirs"). The *Ateneum* was more recently issued in the same city by Kraszewski, but expired at the end of three or four years; the *Biblioteka warszawska* has been more successful; and several Polish literary serials have appeared at Wilna, Cracow, Posen, and Lemberg.—The principal literary periodical of Bohemia, the *Časopis Českeho Muzeum* ("Journal of the Bohemian Museum"), was begun in 1827 by the historian Palacky, edited from 1838 to 1842 by Schafarik, and since that time by Wocel. It has done much toward building up a vernacular literature.—The earliest serial issue of the Hungarian press was the *Magyar muzeum* (1788), started by Kazinczy, Szabó, and Bacsányi; but it soon expired, and Kazinczy for a while conducted the *Orpheus*. The *Tudományos gyüjtemény*, or "Literary Magazine," held from 1817 to 1841, under the editorship of Vörösmarty and others, the first place among Hungarian periodicals, but it had for a time a rival in the *Élet és literatura* ("Life and Literature"), originated in 1826 by Kõlcsey and P. Szemere. The *Figyelmező*, or "Observer" (1837–'48), was an influential literary serial under the charge of Bajza, who in conjunction with Schedel (Toldy) also conducted the "Athenæum," an imitation of the London periodical of the same name, which enjoyed for a considerable time a deserved success. The *Erdélyi muzeum* ("Transylvanian Museum") of Dõbrentei had only a brief existence, and was followed by Toldy's *Uj Magyar muzeum*, or "New Hungarian Museum," and Csengery's *Budapesti Szemle* ("Buda-Pesth Review").—'Ο Λογίος 'Ερμῆς ("The Learned Mercury"), the earliest periodical of modern Greece, was maintained by the contributions of Asopios and other prominent men. To it has succeeded the Εὐρωπαϊκος 'Ερανιστής, or "European Contributor," established by Rangabe and others at Athens in 1840.—In India the issues of the periodical press are of course formed upon English models. The earliest one of a literary character was the "Calcutta Monthly Register" (1790), which lasted for several months. Of its successors the best known are the "Oriental Magazine and Indian Hurkaru," which began at Madras in 1819; the "Madras Miscellany;" the "Calcutta Review" (1844), a valuable existing quarterly; and the "Bombay Quarterly Review," which dates from 1855. At Singapore the "Journal of the Indian Archipelago" has been published since 1847, while the "Chinese Repository," begun by Morrison at Canton in 1832, is filled with valuable articles relating chiefly to the literature and history of the extreme East.—The periodical literature of the Spanish American and other South American states is unimportant, except so far as regards publications in special branches of science and industry.—Reversing the rule which had prevailed in the old world, the United States, as was natural in a new country where scholars and institutions of learning were as yet few, had its journals of entertainment long before its journals of erudition appeared. The date of the first literary periodical is 1741. In that year Franklin issued the "General Magazine and Historical Chronicle" at Philadelphia, on the plan of the "Gentleman's Magazine;" but it existed only half a year, while of the "American Magazine," begun in the same year and city by Webbe, two numbers only were published. The other issues of the kind prior to the revolution were mostly short-lived. They were the "American Magazine and Historical Chronicle" (Boston, October, 1743, to December, 1746); the "Boston Weekly Museum" (4 nos., 1743); the "Independent Reflector" (New York, 1752–'4), which numbered among its contributors Gov. Livingston and the Rev. A. Burr; the "New England Magazine" (Boston, 1758), which ceased after the appearance of a few parts; the "American Magazine" Philadelphia, October, 1757, to October, 1758), published by Bradford; the "North American Magazine" (Woodbridge, N. J., 1758–'66), by S. Nevil; the "American Magazine" (Philadelphia, 1769), by Nicols; the "Royal American Magazine" (Boston, 1774–'5); and the "Pennsylvania Magazine" (Philadelphia, 1775), commenced with articles by Thomas Paine and others, but interrupted by the war. After the conclusion of peace and before the end of the century came the "Columbian Magazine" (Philadelphia, 1786–'9), edited at first by Carey who abandoned it to undertake the "American Museum" (1787–'97), a compilation from the newspapers and other journals of the time, of much historical value; the "Massachusetts Magazine" (Boston, 1789–'96); the "New York Magazine" (1790–'97); the "Farmer's Museum" (Walpole, N. H., 1793), edited from 1796 until near the close of the century by Dennie; the "United States Magazine" (Philadelphia, 1796), by Brackenridge; the "American Universal Magazine" (Philadelphia, 1797); and the "Monthly Magazine and American Review" (New York, 1799-1800), founded by the novelist C. B. Brown, but carried on afterward as the "American Review and Literary Journal" (1801-'2). It would hardly be possible to give a complete list of the numerous literary miscellanies which have been undertaken since 1800 in the principal cities of the Union. A large majority of them never succeeded in obtaining anything like success or permanence. Among them were the "Port Folio" (Philadelphia, 1801-'25), by Dennie, the first American periodical which reached an age of over 10 years; the "Literary Magazine" (Philadelphia, 1803-'8), by C. B. Brown; the "Monthly Anthology" (Boston, 1803-'11), containing articles by Tudor, Buckminster, Thacher, Kirkland, J. S. J. Gardiner, J. Q. Adams, and G. Ticknor; the "Literary Miscellany" (Cambridge, 1804-'5); the "General Repository" (1812-'13), at the same place; the "Mirror of Taste" (Philadelphia, 1810-'11), by Carpenter, who paid much attention to dramatic matters; the "Monthly Register" (Charleston, 1805), the first southern periodical; "Literary Miscellany" (New York, 1811), by Baldwin; the "Analectic Magazine" (Philadelphia, 1813-'20), designed especially for officers in the navy, and edited in 1813-'14 by Irving; the "New York Weekly Museum" (1814-'17); the "Portico" (Baltimore, 1815-'19); Buckingham's "New England Magazine" (Boston, 1831-'5); the "American Monthly Magazine" (New York, 1817-'18); the "Literary and Scientific Repository" (New York, 1820-'21); "Atkinson's Casket" (Philadelphia, 1821-'39), displaced at last by "Graham's Magazine," which from 1840 to 1850 was the best of its class in America; the "Atlantic Magazine" (New York, 1824-'5), by Sands, continued till 1827 as the "New York Review;" the "Southern Literary Gazette" (1825); the "New York Mirror" (1823), begun by Morris and Woodworth, the latter being succeeded by Fay, who gave place to Willis, from which time till 1842 Morris and Willis successfully conducted it; the "Illinois Monthly Magazine" (Vandalia, 1830-'32), the earliest literary publication in the west, edited by J. Hall, who superseded it by the "Western Monthly Magazine" (Cincinnati, 1833-'6); the "American Monthly Magazine" (New York, 1833-'8), established by Herbert and Patterson, and subsequently edited by Park Benjamin; the "Gentleman's Magazine" (Philadelphia, 1837-'40), by W. E. Burton; the "Dial" (Boston, 1840-'44), edited during its first two years by Margaret Fuller, and afterward by R. W. Emerson, the organ of the school of New England transcendentalists; "Arcturus" (New York, 1840-'42), by C. Mathews and E. A. Duyckinck; the "Magnolia" (Charleston, 1842-'3); the "International Magazine" (New York, 1850-'52), under the editorial charge of R. W. Griswold. Much more prominent and successful than any of these were the "Knickerbocker" (founded by C. F. Hoffman at New York in 1832, and continued chiefly under the editorship of Louis Gaylord Clark till 1860), and "Putnam's Monthly" (New York, 1853-'7, and again 1867-'9). These two were the best of the lighter American magazines of the past. The present periodical literature of the United States includes several monthlies of a high class. The "Atlantic Monthly," founded in Boston in 1857, successively edited by J. R. Lowell, J. T. Fields, and W. D. Howells, and sustained by the frequent contributions of Longfellow, Holmes, Whittier, and other leading writers of America, is prominent among these. "Harper's New Monthly Magazine" (New York, 1850) is the most widely circulated of the American monthlies; and others of a similar class more recently established in New York are "Scribner's Monthly," edited by J. G. Holland, and the "Galaxy." "Lippincott's Magazine" (Philadelphia) and "Old and New" (Boston) are monthly publications of like character. The "Overland Monthly" is published in San Francisco, and the "Lakeside Monthly" at Chicago.—All the early magazines drew largely from English sources, but in 1811-'12 appeared at Philadelphia the "Select Views of Literature," solely devoted to reprints from the foreign periodical press; it has been followed by the "Saturday Magazine" (Philadelphia, 1821), the "Museum of Foreign Literature" (Philadelphia, 1822-'39), the "Select Journal of Foreign Periodical Literature," edited by A. Norton and C. Folsom (Boston, 1833-'4), and by two existing publications, "Littell's Living Age" (Boston, 1844) and the "Eclectic Magazine" (New York, 1844). A multitude of magazines filled with light reading, and designed more particularly for circulation among the women of America, have been published, the earliest of which were the "Ladies' Magazine" (Philadelphia, 1799) and the "Lady's Weekly Miscellany" (New York, 1807-'8); later ones were the "Lowell Offering" (1841), chiefly written by female operatives in the New England factories; the "Ladies' Companion" (New York, 1820-'44); the "Columbian Magazine" (New York, 1844-'8); the "Union Magazine" (New York, 1847), by Mrs. Kirkland, afterward published at Philadelphia as "Sartain's Magazine;" "Arthur's Magazine" (Philadelphia); "Miss Leslie's Magazine" (Philadelphia); and the still issued "Godey's Lady's Book" and "Peterson's Magazine" of Philadelphia. Magazines for children appear to have originated with the "Young Misses' Magazine" (Brooklyn, 1806), and have been published since in great numbers. Rather historical than literary have been the "American Register" (Philadelphia, 1806-'10), and periodicals of the same name by Walsh (Philadelphia, 1817) and by Stryker (Philadelphia and New York, 1848-'51), as well as the

"American Quarterly Register" (Andover, 1829–'43), by Edwards. The "New England Historical and Genealogical Register" (Boston, 1852), by Drake, and since by John Ward Dean and others, the "Historical Magazine" (New York, 1857), by Folsom, and the "New York Genealogical Record" (1869), are also filled with American historical and biographical matter.—The review literature of the United States begins with the "American Review of History and Politics" (Philadelphia, 1811–'13), by Walsh; but the ablest and most permanent publication of this sort has been the "North American Review" (Boston, 1815), which has been successively edited by Tudor, E. T. Channing and R. H. Dana, Edward Everett, Sparks, A. H. Everett, Palfrey, Bowen, Peabody, Lowell, Charles Eliot Norton, and Henry Adams, and has constantly maintained a high character both for style and critical ability. The "American Quarterly Review" (Philadelphia, 1827–'37); the "Southern Review" (Charleston, 1828–'32), by Elliott and Legaré; the "Western Review" (Cincinnati, 1828–'30), by Flint; the "New York Review" (1837–'42), established by Hawks, and subsequently edited by J. G. Cogswell and C. S. Henry; and the "Southern Quarterly Review" (Charleston, 1842–'52), were well conducted, but were short-lived. The "Democratic Review" (New York, 1838–'52), afterward the "United States Review" (1853–'5), and subsequently revived by Florence and Lawrence as the "National Democratic Quarterly Review;" the "American Whig Review" (New York, 1845–'52), by Colton and Whelpley; the "Massachusetts Quarterly Review" (Boston, 1847–'50), by T. Parker; and the "New York Quarterly Review" (1852–'3), were also of short duration. The "New Englander" began at New Haven in 1843, and the "National Quarterly Review" at New York in 1860. The "International Review" was begun at New York in 1874, and is published six times a year. Minor critical journals have been the "Literary Review" (New York, 1822–'4), followed by Bryant's "New York Review and Athenæum Magazine" (1825), and its successor, the "United States Review and Literary Gazette" (1826–'7); and several periodicals in imitation of the London literary weeklies have been attempted, such as the "New York Literary Gazette" (1834–'5 and 1839), the "Literary World" (New York, 1847–'53), edited by Hoffman and the Duyckincks, "Norton's Literary Gazette" (New York, 1854–'5), the "Criterion" (New York, 1855–'6), the "Round Table" (1865–'8), and the "Citizen" (1864–'73). "The Literary World," founded in Boston, 1870, by S. R. Crocker, and "Appleton's Journal" (New York, 1869) are successful literary weeklies; the former a critical periodical, the latter general. "The Nation" (New York, 1865), edited by E. L. Godkin, though more properly a weekly newspaper and political review, holds a high place in literary criticism, and has proved successful.—The periodical religious literature of the country dates from the closing years of the last century. Omitting the notice of weekly journals, only those periodicals can here be mentioned which are of recognized importance in connection with the national theological literature. Of these, the following is nearly a complete list: the "Theological Magazine," bimonthly (New York, 1796–'8); "the New York Missionary Magazine," bimonthly (1800–'3); the "Connecticut Evangelical Magazine," monthly (New Haven, 1800–'14); "Monthly Anthology" (Boston, 1803–'11), followed in the exposition of Unitarian sentiment by the "General Repository" (1812–'13), the "Christian Disciple" (1813–'19), the "Christian Disciple and Theological Review," new series (1819–'23), and the "Christian Examiner," bimonthly (1823–'70), edited at various times by Palfrey, Jenks, Walker, Greenwood, Ware, Ellis, Putnam, Hedge, and Hale; the "Panoplist," Boston, commencing in 1805 (edited by Jeremiah Evarts), absorbing in 1809 the "Missionary Magazine," and about ten years later taking the name of the "Missionary Herald," which is still issued as the organ of the American board of missions, but succeeded as a theological publication by the "Spirit of the Pilgrims" (1828–'33), conducted by E. Pond; the "Christian Magazine" (1807–'11), edited by Dr. John M. Mason; the "Christian Herald" (New York, 1816), transformed in its eighth volume, four years later, into the "Sailors' Magazine," still published; the "Christian Spectator" (New Haven), Congregationalist, issued monthly from 1819 to 1828, and quarterly from 1829 to 1838, and succeeded after an interval of five years by the "New Englander" (1843); the "Christian Advocate," monthly (Philadelphia, 1822–'34), Presbyterian; the "Princeton Review," commenced as the "Biblical Repertory" by Hodge in 1825, in 1871 united with the "Presbyterian Quarterly Review," when the titles of the two were combined; the "American Biblical Repository" (New York), issued quarterly from 1831 to 1850, when it was united with the "Bibliotheca Sacra" (Andover, 1844), with which the "Christian Review" (Baptist), commenced at Boston in 1836, and afterward published at New York, has been united, and which also in 1871 absorbed the "Theological Eclectic," established at Cincinnati in 1865; the "American Quarterly Observer" of Edwards (Boston, 1833–'4), united with the "Biblical Repository;" the "American Quarterly Register" (Andover, 1829–'43); the "Literary and Theological Review" (New York, 1834–'9); the "Universalist Quarterly" (Boston, 1843); the "Universailst Quarterly Review," by G. H. Emerson (1844); the "Methodist Quarterly Review" (1841), commenced as the "Methodist Magazine," 1818; Brownson's "Quarterly Review" (Boston and New York, 1844–'64, revived in 1873), begun as the "Boston Quarterly Review," 1838; "American Quarterly Church Review," Episcopal, commenced at New Haven, 1848, and subsequently transferred to New York; "New Englander" (New Haven, 1843); the "Theological and Literary Journal" (New York, 1849–'51), preceded by "Views in Theology" published in occasional numbers (1824–'33); "Evangelical Quarterly Review," Lutheran (1850–'70); "Religious Magazine and Monthly Review" (Boston, 1848), transformed in 1875 into the "Unitarian Review," which is also published monthly at Boston; the "Presbyterian Quarterly" (Philadelphia, 1853–'62), by Wallace, united with the "American Theological Review," founded by H. B. Smith in 1859, and after the union known as the "American Presbyterian and Theological Review" till 1871, when in conjunction with the "Princeton Review" it took the name of the "Presbyterian Quarterly and Princeton Review," by which it is now known; the "Freewill Baptist Quarterly" (Dover, N. H., 1853–'66); "Mercersburg Review" (1854), the new series dating from 1867; the "Protestant Episcopal Quarterly Review" (1854); the "New Brunswick Review" (New Brunswick, N. J., 1854–'5); "Congregational Quarterly" (Boston, 1859); "Presbyterian Magazine" (Philadelphia, 1851–'60), succeeded after an interval by a similar publication first issued at Cincinnati, and subsequently transferred to Philadelphia; the "Catholic World," a prominent Roman Catholic monthly (New York, 1865); the "Baptist Quarterly" (Philadelphia, 1867); the "Reformed Church Monthly" (Philadelphia, 1868); the "Southern Review," commenced in 1867 at St. Louis under the auspices of the Methodist church, South, and still continued at Baltimore; and the "Quarterly Review of the Evangelical Lutheran Church" (1871), succeeding to the "Evangelical Quarterly Review."—Journals devoted to the sciences and the arts, or to particular departments of knowledge, began to be published in the latter years of the 17th century, but were not numerous until the beginning of the 19th, since which they have multiplied with wonderful rapidity, until there is now scarcely any subject of interest, or that can be made an object of investigation, which has not its periodical organs. Every civilized country now has its journals of theology, jurisprudence, medicine, the natural sciences, the mechanical sciences, and agriculture, while in most of them each trade or important industry has its magazines.

PERIOSTEUM. See BONE.

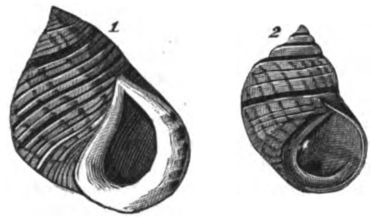
PERIPATETIC PHILOSOPHY. See ARISTOTLE.

PERISTERIA. See HOLY SPIRIT PLANT.

PERITONEUM (Gr. περί, around, and τείνειν, to stretch), the thin, transparent serous membrane which lines the abdominal cavity of man and vertebrates, reflected upon most of its contained organs, and more or less completely enveloping them, and keeping them in place by its folds and prolongations. Like other serous membranes, it is a closed sac, covering but not containing the organs in its cavity; its internal surface, in contact with itself, is smooth and shining, moistened by a serous fluid which permits the natural movements of the organs upon each other. The double folds which, after embracing the small intestine, extend backward to the spinal column, constitute the mesentery. They form a kind of membranous attachment, by which this part of the alimentary canal is held in place, and which yet allows the necessary motions of each portion. Between the two layers of the mesentery are included the blood vessels, nerves, and lymphatic glands and vessels belonging to the small intestine. The folds of peritoneum which embrace the colon and rectum are called respectively the *mesocolon* and *mesorectum.* The double membranous fold, prolonged like an apron from the convexity of the stomach and colon, and floating free over and in front of the intestines, is the *omentum* or *epiploōn;* it is supplied with numerous vessels, and is more or less charged with fat; it serves to keep the intestines in place, and to protect them and the vessels from external injury. In the male fœtus the peritoneum sends a prolongation which accompanies the testis in its descent and becomes the *tunica vaginalis*, which is afterward shut off from the general peritoneal cavity, forming a closed sac of its own. The cavity of the tunica vaginalis, thus formed, encloses the testicle, in the same manner as the remainder of the peritoneum encloses the organs of the abdomen. Folds of the peritoneum also form the suspensory and lateral ligaments of the liver, and the broad ligaments of the uterus. The membrane is liable to common acute inflammation. (See PERITONITIS.)

PERITONITIS, inflammation of the peritoneum. Systematic writers treat of acute, general, and partial peritonitis, of chronic peritonitis, and an epidemic form occurring in childbed fever called puerperal peritonitis, which will be treated under the title PUERPERAL FEVER.—Acute general peritonitis may be caused by admission into the peritoneal cavity of the fluid and gaseous contents of the intestines, or of air or some foreign substance through a wound of the walls of the abdomen. It may result from perforation of the ileum following lesions of typhoid fever, and of the stomach in gastric ulcer; from the discharge of pus from hepatic ovarian or other abscesses; and from the admission of urine from rupture of the bladder. It may also be developed in connection with acute articular rheumatism, or the morbid conditions of the kidney collectively called Bright's disease. Exposure to cold may cause it, and it is not very uncommon among workmen employed in winter and spring to repair water wheels which are damaged by ice. Acute peritonitis is sometimes developed gradually, but in most cases the attack is rapid. Pain of a lancinating or burning character is usually a marked symptom, commencing at a point and extending quickly over the whole abdomen. It is often increased to exacerba tions so as to resemble the spasms of colic. The respiration is hurried, and is almost entirely carried on by the movement of the ribs, contraction of the diaphragm and abdominal muscles producing acute pain. There is great tenderness on pressure over the abdomen, continuing during the course of the disease. The patient generally lies upon the back with the knees raised, to relax the abdominal muscles and take off the weight of bed clothing. The abdomen is often greatly distended, the intestines containing considerable gas, and the peritoneal cavity serous effusion, which post-mortem examinations show to contain coagulated products of inflammation. Vomiting is a frequent and often a prominent symptom, attended by great pain. In the later stages regurgitation of the contents of the stomach is apt to take the place of active vomiting. The pulse is frequent, hard and wiry, beating from 120 to 150 per minute. There is great prostration, and the countenance is haggard and anxious. In some cases the upper lip is raised and tightly drawn across the teeth, and this when present is a characteristic symptom. There is great difficulty in voiding the urine, partly owing to paralysis of the muscular coat of the bladder, and partly to the pain caused by any effort to contract the abdominal muscles, which induces the patient to postpone the act; the use of the catheter is therefore frequently necessary. The intellect is usually little disordered, but slight delirium is common toward the close of fatal cases. The disease is distinguished from acute enteritis by the greater degree of pain, especially on pressure, and of tympanitis, more frequent pulse, and as a rule the absence of diarrhœa, although this sometimes occurs. From colic it may be distinguished by the fact that although the pain may have exacerbations, yet it is continuous, and is always aggravated by pressure, while colic pains are often somewhat relieved by it. Acute general peritonitis is a grave disease, recovery depending more than in most simply inflammatory diseases on management. Judiciously treated cases of idiopathic peritonitis have a good prospect of recovery. When connected with gastric or intestinal ulceration or Bright's disease, the prognosis is always unfavorable, death often taking place in a few hours in cases of perforation, although recovery here sometimes occurs. The average duration of fatal cases of peritonitis is from four to six days. In regard to treatment authorities are somewhat divided. Bloodletting was almost invariably resorted to by the older physicians, and is still used by some; but since about 1852 an important change has taken place, more particularly in the city of New York. Cathartics also used to be employed, but their action is now regarded as injurious. Arrest or retardation of the peristaltic movements of the intestine is one of the principal requirements, and is imperatively demanded in cases of perforation; and this is obtained by full doses of morphine or some opiate. The use of opium in conjunction with other remedies was recommended by Armstrong more than 40, and by Watson more than 30 years ago; but what is known as the opium treatment, upon which almost exclusive reliance is now placed, is due to Prof. Alonzo Clark, who first called attention to it in connection with some cases of puerperal peritonitis in the lying-in wards of Bellevue hospital in 1851–'2. The dose is to be governed by the effect, which should be nearly perfect relief from pain and diminution of the pulse. From half a grain to a grain of some salt of morphia may be given, when in the course of two or three hours the size of the repeated doses may be estimated. In addition to the opiate, warm fomentations over the abdomen, with application of rubefacients to the legs and feet, will be of service. The use of calomel in small doses was formerly practised, and by many is not yet discarded, although when given the doses are greatly reduced, not being more than from one eighth to a quarter of a grain every four hours. Its efficacy is doubtful. Peritonitis is decidedly an asthenic disease, and great caution should be exercised in guarding the patient against depressing agencies. Rice-water drinks and beef tea, in quantities as great as may be borne without increasing the nausea or loading the intestines, are advisable. Tonics and alcoholic stimulants are for the same reason recommended.—Partial peritonitis, or that which is limited to a circumscribed portion of the peritoneum, is the result of inflammation of parts lying beneath the membrane. In ulceration or abscess of some organ, as the liver, that portion of the peritoneum covering the part becomes inflamed, and the conservative tendency in the system is to cause the adjacent fold of the membrane to become attached to it by organized exudation. In cases of wounds of the abdomen, a similar glueing together of the two layers of peritoneum tends to take place, either accompanied with a closing of the orifice or its remaining open. The treatment should be palliative.—Chronic peritonitis is rarely the result of acute, the latter affection generally passing away completely. It is commonly developed as an accompaniment of tuberculosis, when it is known as tuberculous peritonitis. Tuberculous deposits in the mesenteric and intestinal mucous glands are generally present, but the peritonitis may occur without such lesions, or other affection than the tuberculous cachexia. In some cases chronic peritonitis occurs in connection with carcinoma, either seated in the membrane or originating in adjacent structures, and is called cancerous peritonitis. The prognosis in all cases of chronic peritonitis is unfavorable. A fatal termination, even when the affection is not connected with either tubercle or cancer, is the rule; but in this case the duration of the disease may be extended several years. When it is tuberculous or cancerous, the period is confined to a few months or a year or more. The treatment therefore has no reference to recovery, and consists in supporting the strength and relieving local symptoms. Occasionally the accumulation of fluid in the peritoneal sac is sufficient to warrant its removal by tapping.

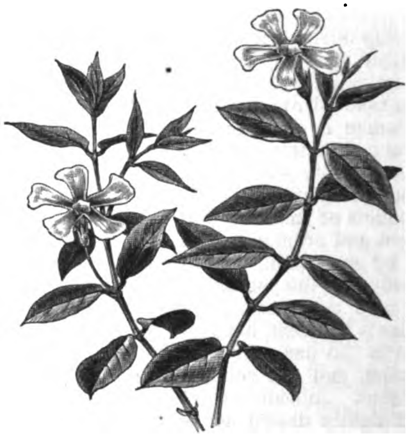
PERIWINKLE, in zoölogy, a pectinibranchiate gasteropod shell, of the genus *littorina* (Férussac). The shell is univalve, with a few spiral whorls, the horny operculum made up also of a few spiral turns; the tentacles are two, the two eyes being at the base on the outside; the mouth is at the end of a proboscis, the gills comb-shaped, and the foot moderate, with a groove on the lower surface. *L. littoralis* (Linn.), which abounds on the English and French coasts, is round, brown, longitudinally streaked with blackish; the shell is thick, and without pearly lining; it is oviparous, and lives in the lowest zone of seaweed between low and high water marks. *L. littorea* is preeminently the periwinkle of the British coast; immense quantities are brought to the London market, and form a considerable article of food for the poorer classes; after being boiled, the animal is picked out of the shell with a pin.



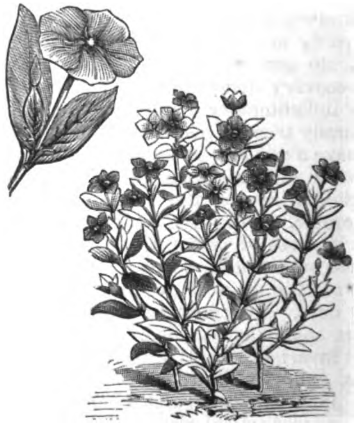
Periwinkle.—1. Littorina littorea. 2. Littorina rudis.

The rough periwinkle (*L. rudis*, Mat.), from the ocean washing the shores of Europe, frequents a higher zone of seaweed; this is ovoviviparous, and the young acquire a calcareous shell before they are excluded, for which reason the species is not eaten. There are many other species, all marine, inhabiting almost all parts of the globe, living on the rocks between the tide marks; three species are very common on the coast of New England, of small size, and probably never eaten.

PERIWINKLE (Lat. *pervinca*, probably from *per*, about, and *vincire*, to bind, from its use in forming chaplets; old Eng. *pervenke* and *pervinke*), a common name for species of *vinca*, which in this country are quite as frequently called myrtle and running myrtle. The genus *vinca* (Lat. *vinculum*, a band) belongs exclusively to the old world; it is placed in the *apocynaceæ*, or dogbane family, which includes the oleander, allamanda, and other showy flowers; some species have weak stems and are trailing, others are erect; while most have evergreen leaves, there is a herbaceous one in cultivation; the flowers have a somewhat bell-shaped tube, with a flat spreading limb having five broad oblique segments; stamens five, inserted on the middle or upper part of the tube; ovaries two, connected at the top by a single style, and becoming in fruit two elongated many-seeded pods, the seeds without the tuft frequently met with in the order. The best known species is the common or lesser periwinkle, *V. minor*, a native of Europe, and wild in England, though supposed to be introduced; it is very common in gardens, where its weak stems spread upon the ground, taking root at the joints; these long stems are sterile, the flowers being borne upon short erect stems, and solitary in the axils of their leaves, appearing in early spring, light blue, and in pleasing contrast to the smooth, dark green evergreen leaves. The large periwinkle, *V. major*, is much larger in all its parts; its leaves are also evergreen and shining, but have a fringe of minute hairs upon the margins; the erect flowering stems are a foot or more high, and the flowers quite large. This is not so common as the preceding, as it is less



Common Periwinkle (Vinca minor).



Madagascar Periwinkle (Vinca rosea).

hardy, and in our northern gardens, while the roots usually survive, the foliage is killed unless in a sheltered place. Both these species have produced several varieties, there being those with white and double flowers, and of both kinds there are forms with variegated leaves. Though very old-fashioned, they are useful plants, and especially the variegated kinds, planted in vases, baskets, and flower stands, where their long stems can hang over the edge; they are sometimes used as edgings to beds, and to form a carpet beneath shrubbery; the smaller species grow well in the shade, and may be used to cover the ground where grass will not flourish. As the stems root so freely, the plants may be divided indefinitely. The herbaceous species (*V. herbacea*), from Hungary, flowers later than the foregoing; as its name indicates, its stems die down every winter; in manner of growth it is similar to the others, and being less rampant it is preferred for planting on rockwork. A greenhouse species, *V. rosea*, from the West Indies, but called Madagascar periwinkle, has erect stems, somewhat woody at base, persistent veiny leaves, and large axillary, showy flowers, which are rose-colored, white, or white with a red eye; it is an abundant bloomer, and is often used in the borders as a bedding plant.

PERJURY, the crime of false swearing. He commits perjury who, under oath lawfully administered in a judicial proceeding or course of justice, wilfully gives false testimony material to the issue or point in question. The offence is thus defined at common law. In many of the United States it is particularly defined by statutes; and these extend the definition, and in some cases make it embrace all false oaths corruptly taken, where an oath by law is required or authorized, whether in judicial proceedings or not. It may be said generally that wherever, under the common law of the land, an oath is required in the regular administration of justice, there the crime is possible. The offence cannot be founded on the violation of a mere oath of office. For example, an officer, public or private, who neglects to execute his office in pursuance of his oath, or acts contrary to the tenor of it, is not indictable for perjury. Nor can the common law offence consist of the violation of an oath taken in any purely extra-judicial proceeding; as a false affidavit to an account to be rendered by an administrator, or false swearing before a justice of the peace, before whom no cause in any stage is pending. So, though false testimony given before a commissioner appointed by a court under the common rule is perjury, yet it is not so when given in depositions taken by consent before unauthorized persons. It matters not whether the untrue evidence was given in the principal investigation of the matter in issue, or whether it was in some preliminary or incidental proceeding. Not only, therefore, may it be committed by a witness who is giving oral testimony in a trial in open court, but it may be as well in the preliminary information or complaint before a magistrate, or in statements made before the grand jury, or in a deposition made before a commissioner duly authorized to take it. So the examination of a poor debtor before a magistrate is a course of justice, and false swearing there is perjury. The hearing of a cause must furthermore be really, not apparently only, a judicial proceeding. For, if a judge who seemed to have authority, yet had none in fact, administered the oath, or if a suit, though properly brought, had yet in fact abated by the death of a party, and thus passed out of the court's jurisdiction, false swearing in either case is not indictable. But perjury is not excused if the pleadings were merely informal and amendable, or if the proceedings were voidable but not void. It is further essential that an oath was lawfully administered. The indictment therefore usually recites that the party was in due manner sworn and took his corporal oath to speak the truth. It is enough, however, to avow that the party was duly sworn, without alleging the mode in which the oath was administered. Yet, if the allegation be of a specific mode, a variance in the proof will be fatal; and perhaps the indictment would fail if it charged that the party was sworn, when in fact he only made solemn affirmation of the truth. The oath, as we have already implied, can be well administered only by competent authority, and before a court or magistrate having legal right to proceed in the cause. It suffices in the indictment to allege this competent power and authority, without setting forth the facts which constitute jurisdiction.—In proof of the falsity of the testimony, which is also an essential element of the offence, it is not requisite to recite the exact words uttered, with the same nicety as in the case of forgery or libel. It is sufficient to allege substantially what the defendant said as to the matter in question, and that he knew it to be false. The false testimony must be given wilfully. It has sometimes been held that the allegation of wilful and corrupt falsehood is well supported by evidence that the accused swore rashly to that which he did not know, and, though he believed it, yet had no probable cause for believing. But the better opinion seems to be, that perjury is not committed if the party gave his testimony in accordance with his belief, no matter how carelessly or rashly that belief may have been formed. In other words, a distinct corrupt intent is essential to the crime.—Finally, the false testimony must be material to the point in controversy. The degree of materiality is of no importance, nor is it necessary that the false declaration immediately and directly touch the issue; it suffices if it remotely or collaterally affect it. Perjury then may be committed, if the testimony tend to increase or diminish the damages or punishment, or if it concern the credibility of the witness himself, or of any other witness in the case. A false answer to a question put by way of cross examination may therefore lay the foundation of an indictment; and it has been held to be perjury where a party, after being particularly cautioned as to his reply, answered falsely to an interrogatory, put merely with the design of impairing his credit as to that part of the evidence which was immediately material.

PERKINS, Elisha, an American physician, the inventor of the metallic tractors, born in Norwich, Conn., Jan. 16, 1741, died in New York, Sept. 6, 1799. He was educated by his father for the profession of medicine, and began the practice of it in Plainfield, where he was very successful. About 1796 he invented the metallic tractors, consisting of two instruments, one resembling brass and the other steel, but professedly of a peculiar composition of metals, three inches long and pointed at the ends. They were used chiefly in local inflammations, such as pains in the head, face, teeth, and side, in rheumatism and similar diseases, the points being applied to the part, and then drawn over it in a downward direction for about 20 minutes. This method of cure was recommended by the faculties of three institutions in the United States. In Copenhagen 12 physicians and surgeons, most of them instructors in the royal Frederick's hospital, began a course of experiments, an account of which was published in an octavo volume, and gave their opinion in favor of the new system, which they called Perkinism. In London, where the tractors were introduced by Dr. Perkins's son, a Perkinian institution, under the presidency of Lord Rivers, was established, chiefly for the benefit of the poor. The cases of cures published numbered 5,000, and were certified to by 8 professors, 40 physicians and surgeons, and 30 clergymen. The list of persons claimed to have been cured by this remedy amounted to an almost fabulous number; but a few years after the death of the inventor the tractors fell into neglect almost as speedily as they had become celebrated. Dr. Perkins invented also an antiseptic medicine, and administered it with great success in the low state of dysentery and ulcerated sore throat. Anxious to test its efficacy against the yellow fever, he went to New York in 1799 during the prevalence of that disease; but after four weeks of unremitting toil he himself died of the fever.

PERKINS, George Roberts, an American mathematician, born in Otsego co., N. Y., May 3, 1812. He was self-educated, and at the age of 18 was employed in the slackwater survey of the Susquehanna river. He was a teacher of mathematics in the "Liberal Institute" at Clinton, N. Y., from 1831 to 1838, when he became principal of the Utica academy. In 1844, at the opening of the state normal school, he was chosen professor of mathematics, and four years later was elected principal. In 1852 he resigned and superintended the erection of the Dudley observatory. He has published a series of arithmetics (1840-'51); "Treatise on Algebra" (1841); "Elements of Algebra" (1844); "Elements of Geometry" (1847); "Trigonometry and Surveying" (1851); and "Plane and Solid Geometry" (1854).

PERKINS, Jacob, an American inventor, born in Newburyport, Mass., July 9, 1766, died in London, July 30, 1849. He was apprenticed to a goldsmith, and invented a new method of plating shoe buckles. When he was about 21 years of age he was employed by the commonwealth of Massachusetts to make dies for copper coinage. Soon afterward he invented a machine for cutting and heading nails at one operation, but through the mismanagement of his partners he was involved in great pecuniary distress. In bank-note engraving he made most important improvements, substituting steel for copper plates. (See ENGRAVING.) About 1814 he went to Philadelphia and became associated with the firm of Murray, Draper, and Fairman, bank-note engravers. In 1818 he went to England, accompanied by Mr. Fairman and a number of workmen, and obtained a contract for supplying the bank of Ireland with plates, and in partnership with Mr. Heath carried on his business in London for a number of years. He also constructed a gun in which steam, generated at an enormous pressure, was used as the propelling power instead of gunpowder, and instituted experiments which demonstrated the feasibility of his plan, though it has been generally condemned as inapplicable to modern warfare. Balls passed through 11 planks of the hardest deal, each an inch thick, placed some distance apart, and with a pressure of only 65 atmospheres penetrated an iron plate a quarter of an inch thick. He screwed to a gun barrel a tube filled with balls, which falling into the barrel by their own weight were discharged at the rate of nearly 1,000 a minute. The expense of working such a gun was calculated at about $\frac{1}{300}$ part of the cost of the powder required to discharge an equal number of balls by the usual method. Mr. Perkins also invented an instrument called the bathometer, to measure the depth of water, and the pleometer, to mark with precision the speed at which a vessel moves through the water; and he was the first to demonstrate that water is compressible.

PERKINS, Justin, an American missionary, born at West Springfield, Mass., March 12, 1805, died at Chicopee, Mass., Dec. 31, 1869. He graduated at Amherst college in 1829, spent two years in Andover theological seminary, and was for nearly a year tutor in Amherst college. In 1833 the American board designated him to commence a mission to the Nestorians of Persia, and he was ordained Sept. 8. Soon afterward he sailed with his wife, and, after many difficulties, reached Urumiah in November, 1834. By the aid of a priest he reduced the language of the Nestorians to writing, and translated the whole Bible into the modern Syriac. He also translated other books, and prepared and published a commentary on Genesis and Daniel, besides aiding in the general missionary work and in establishing and directing the various mission schools. In 1842 he visited America, and brought with him Mar Yohanan, a bishop of the Nestorian church, who was one of the first converts. He returned to Persia in 1843, and was called soon after in company with another missionary to visit Teheran, the capital, to defend the Protestants against misrepresentation and persecution, in which he was entirely successful. He visited his native country a second time in 1858, and again in 1868. His connection with the mission, of which he was the chief support, lasted about 36 years. He published "A Residence of Eight Years in Persia" (Andover, 1843).

PERKINS, Thomas Handasyd, an American merchant, born in Boston, Mass., Dec. 15, 1764, died in Brookline, Jan. 11, 1854. After spending some years in a counting house, he became associated with his brother James in a mercantile house in Santo Domingo. The climate proving prejudicial to his health, he returned to Boston. In 1789 he went as supercargo to Batavia and Canton, and afterward made several successful ventures in the Pacific, on the N. W. coast of America, and in China. He then formed a partnership with his brother James, which for the next 30 years was remarkable for the extent, foresight, and success of its enterprises. In 1805 he was elected to the Massachusetts senate, and for 18 or 20 years subsequently he was most of the time a member of one or the other branch of the legislature. He heartily aided many schemes of practical philanthropy, and was one of the chief contributors to the funds of the Massachusetts general hospital and the Boston Athenæum. In 1833 he gave his mansion house and grounds in Pearl street, worth over $50,000 for a blind asylum (now the Perkins institution and Massachusetts asylum for the blind), on condition that $50,000 should be raised as a fund for its support.

PERM. I. A government of Russia, lying partly in Europe and partly in Asia, though officially wholly included in Europe, and bordering on Vologda, Tobolsk, Orenburg, Ufa, and Viatka; extreme length 500 m., breadth 450 m.; area, 128,216 sq. m.; pop. in 1867, 2,173,501. The Ural mountains traverse it N. and S., dividing the government into two unequal parts, that in Europe being the larger. Deneshkin Kamen, the loftiest summit, is 5,360 ft. above the sea; and the principal pass across the Ural leads by Kungur, between Perm and Tobolsk. From the principal chain the surface descends in a series of terraces, and a great part of it is mountainous. The European portion belongs principally to the basin of the Caspian, and the Asiatic to that of the Arctic ocean. The Kama, an affluent of the Volga, enters the government from the northwest, and leaves it at the southwest, receiving many tributaries, the most important of which are the Vishera, Kosva, and Tschusovaya. The E. part has several lakes, and is drained by numerous tributaries of the Obi, the largest of which are the Sosva, Losva, Tura, Pyshma, Iset, and Miyas. The climate of the elevated regions and of the north is cold and bleak. Gold, silver, platinum, iron, copper, lead, diamonds, and other precious stones, loadstone, salt, and marble are found. The S. W. part is generally fertile, but elsewhere the soil is better suited for pasture than agriculture, and much of it is uncultivated. Rye, barley, oats, potatoes, flax, and different vegetables are grown. Oak, elm, cedar, pine, and larch are the chief trees. The forests abound in large and small game; the rivers are filled with fish, including sturgeon and salmon, and many of the inhabitants find employment in hunting, fishing, and cutting wood for use at the mines. The government mines are extensively worked. Excepting such industries as are connected with mining, there are few manufactures; but some cloth, leather, soap, glass, and candles are made. About three fourths of the inhabitants are Russians, and the remainder are composed of various Finnic and Tartar tribes. By far the greater part belong to the Greek church, but there are some of other Christian sects, and about 4 per cent. are Mohammedans. II. A city, capital of the government, on the left bank of the Kama, in lat. 58° 1′ N., lon. 56° 16′ E., 700 m. E. N. E. of Moscow; pop. in 1867, 22,712. The houses are chiefly constructed of wood. It is the seat of a Greek bishop, and there are nine churches, several public buildings, a convent, hospitals, a gymnasium, a theological seminary, extensive iron founderies, and copper refineries.

PERMUTATION. See COMBINATIONS.

PERNAMBUCO. I. An eastern province of Brazil, bounded N. by Ceará and Parahyba, E. by the Atlantic, S. by Alagôas, Bahia (from which it is separated by the Rio São Francisco), and Minas Geraes, and W. by Piauhy, the dividing line with which is the Serra dos Dous Irmãos; area, 57,583 sq. m.; pop. in 1871, 1,250,000. The coast of this province, which comprises the larger part of the northern side of the São Francisco basin, is 185 m. long, and for the most part low, with high red cliffs fronting the sea. There are few ports capable of admitting large vessels. That of Recife or Pernambuco, the capital, is defended by a reef (whence its name) remarkable for its length and straightness; a part of it has been built up with masonry, to render it still more efficient as a breakwater. The face of the country is divided into three zones: the *mattas* or littoral, very fertile, and densely wooded; the *carrasco* or bushwood zone, undulating and dry, but yielding good crops of cotton and vegetables; and the *sertão* or elevated zone, very mountainous, stony, and dry, being only suitable for pasturage. There do not appear to be any summits of over 4,000 ft. above the sea. All the drainage of the middle and western portions is into the São Francisco, some of the streams being quite large. The chief rivers emptying into the ocean are the Una, Capibaribe, Ipojuca, Serenhaêm, and Pirapama; none of them are navigable, being almost entirely dry during the dry season, and greatly swollen in the rainy season. The climate on the coast is damp, but the excessive heat is here somewhat modified by sea breezes, while in the interior no tempering influence exists. There are extensive and valuable forests. The region of the *mattas* produces large quantities of sugar, molasses, and rum, and cotton is also extensively cultivated and of fine quality; but the system of agriculture is very inefficient. Mandioca and cocoanuts are the only other important productions, the latter from large groves planted on the coast. Cattle rearing is largely carried on in the *sertão;* and there are in the coast region numerous mills for producing mandioca flour. Public instruction is flourishing. In 1878 there were 466 primary schools and 25 grammar schools, with 17,175 pupils; and there are several higher schools in the capital. The principal towns are Recife, Monteiro, Goyanna, Tamandaré, Rio Formozo, and Serenhaêm. **II.** A city, capital of the province. (See Recife.)

PERNAU, a seaport town of Russia, in Livonia, at the mouth of the Pernau, on the gulf and 100 m. N. by E. of the city of Riga; pop. in 1867, 9,527. It has two Lutheran churches, a Greek church, and several schools. The principal trade is in flax, hemp, various seeds, grain, wood, and leather. The shipping in 1878 comprised 240 vessels; value of imports, 287,217 rubles; of exports, 7,006,317 rubles.

PÉRON, François, a French traveller, born at Cérilly, Bourbonnais, Aug. 22, 1775, died there, Dec. 14, 1810. He enlisted as a volunteer in 1792, was wounded at the siege of Landau, and made a prisoner at the battle of Kaiserslautern, taken to the citadel of Magdeburg, and released in 1794. In 1800 he was attached in the capacity of zoölogist to the expedition sent by the French government under Capt. Baudin to explore Australia, and wrote *Voyage de découvertes aux terres australes pendant les années* 1800–1804 (3 vols. 4to, with an atlas, Paris, 1807–'16). The third volume was prepared after his death by M. de Freycinet. He had previously published *Observations sur l'anthropologie* (Paris, 1799).—See *F. Péron, naturaliste voyageur aux terres australes*, by Maurice Girard (Paris, 1857).

PÉRONNE, a town of France, in the department of Somme and on the right bank of the river Somme, 27 m. E. by N. of Amiens; pop. in 1866, 4,262. It is strongly fortified, and acquired historical importance under the reign of Louis XI., who was imprisoned here by Charles the Bold (1468). In 1536 the town won the designation of *la Vierge* or the impregnable by a successful resistance to the besieging imperialists. The league was signed at Péronne in February, 1576. In 1815 it surrendered to Wellington, and on Jan. 9, 1871, to the Germans after 13 days' resistance.

PÉROUSE, La. See La Pérouse.

PERPETUAL MOTION, in mechanics, a machine which when set in motion would continue to move without the aid of external force and without the loss of momentum, until its parts became deranged or worn out. Although the impossibility of constructing such a machine has long been demonstrated, many attempts have been made, an interesting history of which has been given by Henry Dircks, "Perpetuum Mobile, or a History of the Search for Self-motive Power" (London, 1870). The earliest record of a contrivance for effecting mechanical perpetual motion was by Wilars de Honecourt, an architect of the 15th century, whose sketch book containing the accompanying cut, fig. 1, is in the *école des chartes* at Paris. This contains the imaginary principle upon which most of the perpetual motion machines having any plausible appearance of effecting the object have been constructed. The design will be made more apparent by fig. 2, a revival of the same plan by Capra (Bologna, 1678), in which the weights by reason of their mode of attachment take a position further from the centre of motion when descending than when ascending. It will be readily seen that this dispositon of the weights may be effected, but the result will be that of those which are on the ascending side there will be a greater number at any one time than of those on the descending side, and it may be computed that the mechanical force of the ascending will exactly balance that of the descending weights. The machine of the marquis of Worcester, which has great historical prominence on account of the rank of its inventor, was a wheel ostensibly moved in a similar manner. An account of it and of the attention it commanded,

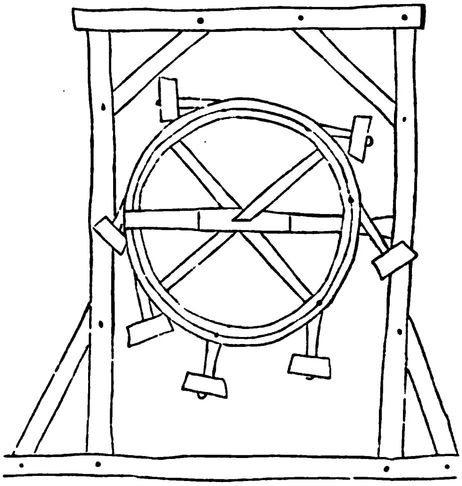


Fig. 1.—Facsimile of Sketch by Wilars de Honecourt.

as well as of the machine of Orffyreus, and also of other engines sought to be moved by water and other means, may be found in Mr. Dircks's work. Ever since the establishment of the laws of motion, about the middle of the 17th century, the impossibility of producing such a perpetual motion has been apparent to all who have mastered the principles of mechanics. Admitting the third law, that action and reaction are equal, perpetual motion can only become possible when a body once set in motion shall meet with no resistance, which is an impossible condition. If a top could be made to spin in a perfect vacuum upon a point without friction, it might never come to rest; but it could exert no external force without losing its own. The impossibility of a perpetual motion was assumed by Stevinus in the demonstration of a principle in statics. He supposed an endless chain of balls hung over two unequal inclined planes of equal altitude, the chain forming a loop beneath the planes. It is demonstrated that the weight of the balls on each plane, multiplied into the reciprocal length of the planes, will be equal, and that therefore the forces will balance each other; but Stevinus concluded that an equilibrium would result by assuming that otherwise an absurdity, viz., a perpetual motion, could take place. Another demonstration of the impossibility of perpetual motion is the establishment of the doctrine of the conservation of forces. (See CORRELATION AND CONSERVATION OF FORCES, HEAT, and MECHANICS.) This doctrine was advocated by Count Rumford, and demonstrated by him with a considerable approach to accuracy; but the more recent investigations of Joule are regarded as more satisfactory and complete. The doctrine has also been advocated in a theoretical manner by Dr. Mayer of Heilbronn and by Professors Henry, Balfour Stewart, Maxwell, Grove, and others. But it can hardly be said that this places the matter in any clearer light than that given by the laws of motion. In either aspect a mechanical perpetual motion is clearly an absurdity.

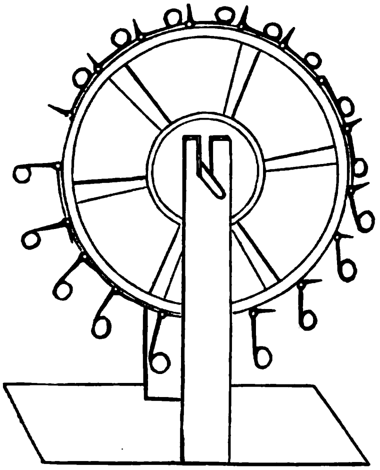


FIG. 2.—Capra's Machine.

PERPIGNAN, a city of S. France, capital of the department of Pyrénées-Orientales, on the right bank of the Tet, at its confluence with the Basse, 6 m. from the Mediterranean, 34 m. S. of Narbonne, and 425 m. S. by E. of Paris; pop. in 1872, 27,378. It commands the S. E. entrance to France from Spain by the Pyrenees, and is strongly fortified with a wall and fosse, and commanded by a citadel with a double line of defences. In character the city is Spanish. Its streets are narrow and dirty, and the houses are semi-Moresque, with wooden balconies and inner courts. Over the Basse there is a bridge of a single arch, and one of seven arches over the Tet. Most of the public buildings date from the Spanish period, and are built of brick or rolled pebbles. In the building of the former university, an institution of the 14th century which was abolished by the revolution, is the public library, containing 18,000 volumes. The city has a fine cathedral, a theological seminary, a high school, a botanic garden, two hospitals, manufactories of woollen cloth, lace, leather, soap, and soda, and a considerable commerce in red wines, liqueurs, brandy, oil, silk, wool, iron, and cork. —Perpignan belonged with the province of Roussillon to the kingdom of Aragon, but was taken by the French in 1475, after being reduced by famine. Restored to Spain, it was again conquered in 1642, and finally included in the cession to France of Roussillon in 1659. The Spaniards were defeated by the French under the walls of the city in 1794.

PERQUIMANS, a N. E. county of North Carolina, bordered S. by Albemarle sound, and drained by Perquimans river; area, about 200 sq. m.; pop. in 1870, 7,945, of whom 3,998 were colored. It has a nearly level surface, and the soil is generally fertile. The chief productions in 1870 were 34,232 bushels of wheat, 310,185 of Indian corn, 27,519 of oats, 32,851 of sweet potatoes, 1,340 tons of hay, and 598 bales of cotton. There were 738 horses, 1,061 milch cows, 1,906 other cattle, 847 sheep, and 7,367 swine. Capital, Hertford.

PERRAUD, Jean Joseph, a French sculptor, born at Monay, department of Jura, in 1819. He was apprenticed to a wood carver, studied in Lyons and Paris, and won the grand prize in 1847, which entitled him to several years' residence in Rome, where he executed a bass relief entitled "Leavetaking." Among his subsequent works are statues of "The Childhood of Bacchus," "Ste. Geneviève," and "Galatea;" many works for public buildings, including a group of "The Day" for the avenue of the Observatory (1874), and of "The Lyrical Drama" for the new opera house opened in 1875, busts of Mozart and Beethoven for the theatre at Baden-Baden, &c. His masterpieces are the statues of a man struggling with destiny, which he called "Adam," of "Despair," and of a faun.

PERRAULT, Charles, a French author, born in Paris, Jan. 12, 1628, died there, May 16, 1703. He was educated at the collége de Beauvais, studied law, and was admitted to practise at the Paris bar in 1651. In 1654 he entered as a clerk the employment of his brother, who held an office in the department of finance. He rose rapidly in the department, largely through the influence of Colbert, and filled the places of head clerk and afterward of superintendent of the royal buildings. He was admitted to the academy in 1671, where he exercised much influence and introduced great reforms. Perrault produced a great number of works, from an early burlesque on part of the Æneid, written before his examination for the bar, to the book he considered his most important one, *Parallèle des anciens et des modernes* (4 vols., 1688-'98), and his volume of biographies, *Hommes illustres du siècle de Louis XIV.* (folio, 1696-1701). His writings were on subjects of every kind, and comprised poems, dramas, burlesques, compilations, histories, &c.; but all, including the two works above named, have long been practically forgotten, except his collections of fairy tales. These *Contes des fées*, appearing between 1670 and 1702, were considered by him of little consequence; but they attained great popularity, and have been translated into many languages. His *Mémoires* were published at Avignon in 1759.—His elder brother CLAUDE (1613-'88), originally a physician and afterward an architect, was the author of the plans for the new Louvre and the observatory, of a translation of Vitruvius, and of other architectural books.

PERRENOT, Antoine. See GRANVELLE.

PERRON, Anquetil du. See ANQUETIL-DUPERRON.

PERRONE, Giovanni, an Italian theologian, born in Chieri, Piedmont, in 1794. Having graduated as doctor of theology in the university of Turin, he entered the society of Jesus in Rome in 1815, and in 1816 was sent to teach theology at Orvieto. He was appointed professor of theology in the Roman college in 1823, and held this post, with a few intervals during which he filled the office of rector in the college of Ferrara (1830-'33) and in the Roman college (1853-'6), down to the suppression of the Jesuit houses in 1873. In 1848 he took refuge with some of his pupils in England, and opened for them and the young English Jesuits a course at Stonyhurst, returning to Rome in 1850. In 1854 he took a leading part with Passaglia in the discussions preliminary to the promulgation of the bull *Ineffabilis Deus*, defining the dogma of the Immaculate Conception, and was equally conspicuous during the council of the Vatican. Padre Perrone has long been a prominent member, as consultor, of nearly all the papal congregations on doctrine, discipline, and liturgy. His lectures on theology since 1835 have superseded all others in nearly all the Roman Catholic schools in both hemispheres. Among upward of 60 different works published by him, the following are the most important: *Prælectiones Theologicæ* (9 vols. 8vo, Rome, 1835), which has had upward of 30 editions, and has been translated into French and German; *Prælectiones Theologicæ*, abridged from the above (4 vols., 1845; 31st ed., 1864); *Tractatus de Matrimonio* (Rome and Lyons, 1840); *Synopsis Historiæ Theologiæ cum Philosophia comparatæ* (Rome, 1845); *De Immaculato B. V. Mariæ Conceptu: an Dogmatico Decreto definiri possit* (1847; reëdited several times, and translated into French, German, and Dutch); *Il Protestantismo e la regola di fede* (3 vols., 1853; French translation, Paris, 1854); *Memoriale Prædicatorum* (2 vols., 1864); and *De Divinitate D. N. Jesu Christi* (Turin, 1870).

PERROT, Georges, a French archæologist, born at Villeneuve-Saint-Georges, department of Seine-et-Oise, Nov. 12, 1832. He studied at the collége Charlemagne, at the normal school, and from 1855 to 1858 at the French school in Athens. He was professor in various places till 1863, when he became connected with the lyceum Louis-le-Grand, where he was subsequently appointed titular professor of rhetoric. He explored Asia Minor in 1861, and spent some time at Ancyra in researches relating to the inscription on the temple erected there by the Galatians in honor of Augustus, known as the monument of Ancyra or the political testament of Augustus. In conjunction with the architect Edmond Guillaume and Jules Delbet, he published, under the auspices of the government, *L'Exploration archéologique de la Galatie et de la Bithynie, d'une partie de la Mysie, de la Phrygie, de la Cappadoce et du Pont* (2 vols., Paris, 1862-'9). His other works comprise *Souvenirs d'un voyage en Asie Mineure* (1864); *Mémoire sur l'île de Thasos* (1864; new ed., 1867); *L'île de Crète* (1866); *De Galatia, Provincia Romana* (1867); and *Essai sur le droit public et privé de la république athénienne* (1867), which won a Montyon prize from the academy. He has also translated in conjunction with Georges Harris the fourth edition of Max Müller's "Science of Language."

PERRY, the name of counties in ten of the United States. I. A S. county of Pennsylvania, bounded E. by the Susquehanna, and intersected toward the north by the Juniata river and south by Sherman's creek; area, 540 sq. m.; pop. in 1870, 25,447. Its surface is mountainous, the Tuscarora range forming the N. W. boundary and the Blue mountains the S. E., but much of the land is very fertile. It is intersected by the Pennsylvania railroad. The chief productions in 1870 were 286,725 bushels of wheat, 29,508 of rye, 417,235 of Indian corn, 435,885 of oats, 118,197 of potatoes, 25,263 tons of hay, 20,449 lbs. of wool, and 866,221 of butter. There were 4,885 horses, 5,501 milch cows, 7,001 other cattle, 7,119 sheep, and 10,906 swine; 4 manufactories of boots, 11 of iron, 22 of tanned and 15 of curried leather, 3 of woollen goods, 3 wool-carding and cloth-dressing establishments, 16 flour mills, and 8 saw mills. Capital, Bloomfield. **II.** A central county of Alabama, intersected by the Cahawba river; area, 590 sq. m.; pop. in 1870, 24,975, of whom 17,833 were colored. It has an undulating surface and fertile soil. The Selma, Marion, and Memphis railroad passes through it. The chief productions in 1870 were 341,985 bushels of Indian corn, 13,800 of sweet potatoes, and 13,449 bales of cotton. There were 929 horses, 2,160 mules and asses, 2,291 milch cows, 3,108 other cattle, 2,374 sheep, and 7,903 swine. Capital, Marion. **III.** A S. E. county of Mississippi, intersected by Leaf river and Black creek, tributaries of the Pascagoula, and drained by their branches; area, 1,044 sq. m.; pop. in 1870, 2,694, of whom 723 were colored. It has a broken surface and a not very fertile soil, covered with forests of pine. The Alabama Central railroad passes through the S. W. corner. The chief productions in 1870 were 51,301 bushels of Indian corn, 6,012 of oats, 27,109 of sweet potatoes, 12,106 lbs. of wool, 15,890 of rice, and 164 bales of cotton. There were 554 horses, 3,160 milch cows, 5,691 other cattle, 6,898 sheep, and 6,928 swine. Capital, Augusta. **IV.** A central county of Arkansas, bounded N. E. by the Arkansas river and intersected by the Fourche la Fève, one of its branches; area, about 600 sq. m.; pop. in 1870, 2,685, of whom 290 were colored. It has a diversified surface, and the soil is generally fertile, particularly near the streams. The chief productions in 1870 were 85,115 bushels of Indian corn and 980 bales of cotton. There were 742 horses, 919 milch cows, 2,301 other cattle, 1,240 sheep, and 7,288 swine. Capital, Perryville. **V.** A W. county of Tennessee, bounded W. by the Tennessee river and intersected by the Buffalo, a branch of Duck river; area, about 400 sq. m.; pop. in 1870, 6,925, of whom 472 were colored. Its surface is diversified and the soil is generally fertile. The chief productions in 1870 were 34,537 bushels of wheat, 368,045 of Indian corn, 70,296 of buckwheat, 5,244 lbs. of tobacco, 10,429 of wool, 45,659 of butter, 7,446 gallons of sorghum molasses, and 495 bales of cotton. There were 1,706 horses, 804 mules and asses, 1,971 milch cows, 928 working oxen, 2,297 other cattle, 5,328 sheep, and 17,950 swine. Capital, Linden. **VI.** A S. E. county of Kentucky, drained by the North and Middle forks of the Kentucky river; area, about 700 sq. m.; pop. in 1870, 4,274, of whom 96 were colored. It has a mountainous and rugged surface, the valleys being arable and fertile and the higher lands adapted to wool growing. The chief productions in 1870 were 135,454 bushels of Indian corn, 9,446 of potatoes, 24,406 lbs. of butter, and 10,007 of wool. There were 644 horses, 1,637 milch cows, 3,384 other cattle, 7,025 sheep, and 9,492 swine. Capital, Hazard. **VII.** A S. E. county of Ohio, drained by several small streams; area, 400 sq. m.; pop. in 1870, 18,453. It has an undulating surface and a fertile soil. The Cincinnati and Muskingum valley railroad passes through it. The chief productions in 1870 were 196,352 bushels of wheat, 681,612 of Indian corn, 132,208 of oats, 79,496 of potatoes, 25,581 tons of hay, 65,552 lbs. of tobacco, 374,331 of wool, 623,153 of butter, and 39,005 gallons of sorghum molasses. There were 6,241 horses, 6,340 milch cows, 11,419 other cattle, 85,290 sheep, and 16,122 swine; 6 manufactories of carriages and wagons, 31 of stone and earthen ware, 2 of woollens, 8 flour mills, 7 saw mills, 4 tanneries, and 4 currying establishments. Capital, Somerset. **VIII.** A S. county of Indiana, bounded S. and E. by the Ohio river, which separates it from Kentucky, and drained by Anderson's and other creeks; area, about 400 sq. m.; pop. in 1870, 14,801. It has a very hilly surface and a soil fertile along the streams. The chief productions in 1870 were 55,224 bushels of wheat, 288,705 of Indian corn, 62,495 of oats, 83,918 of potatoes, 74,300 lbs. of butter, 17,345 of wool, 224,125 of tobacco, and 5,544 tons of hay. There were 2,770 horses, 2,520 milch cows, 3,443 other cattle, 9,013 sheep, and 15,224 swine; 5 manufactories of carriages and wagons, 1 of cotton goods, 1 of agricultural implements, 4 of furniture, 3 flour mills, 6 saw mills, 3 distilleries, and 4 breweries. Capital, Cannelton. **IX.** A S. county of Illinois, intersected by Beaucoup creek; area, about 430 sq. m.; pop. in 1870, 13,723. It has a diversified surface, and much of the soil is fertile. It is intersected by the Illinois Central, the Chester and Pamaroa, and the St. Louis, Belleville, and Southern Illinois railroads. The chief productions in 1870 were 350,446 bushels of wheat, 384,446 of Indian corn, 338,760 of oats, 36,514 of potatoes, 111,982 lbs. of butter, 33,299 of wool, and 5,057 tons of hay. There were 4,527 horses, 3,095 milch cows, 3,763 other cattle, 10,255 sheep, and 14,430 swine; 2 manufactories of boots and shoes, 6 of carriages and wagons, 1 of machinery, 5 of saddlery and harness, and 5 flour mills. Capital, Pinckneyville. **X.** A S. E. county of Missouri, separated from Illinois by the Mississippi river, and drained by several small streams; area, 430 sq. m.; pop. in 1870, 9,847, of whom 400 were colored. It has a diversified surface and a fertile soil. The chief productions in 1870 were 280,674 bushels of wheat, 331,375 of Indian corn, 112,234 of oats, 25,760 of barley, 23,982 of potatoes, 10,817 tons of hay, 3,480 lbs. of tobacco, 18,292 of wool, 146,905 of butter, and 16,411 gallons of sorghum molasses. There were 3,668 horses, 676 mules and asses, 2,582 milch cows, 3,027 other cattle, 8,859 sheep, and 17,474 swine; 9 cooper shops, 3 breweries, 3 flour mills, and 4 saw mills. Capital, Perryville.

PERRY, Arthur Latham, an American political economist, born in Lyme, N. H., Feb. 27, 1830. He graduated at Williams college in 1852, and became in 1854 professor of history and political economy there. He is an advocate of free trade, and has published "Elements of Political Economy" (New York, 1865).

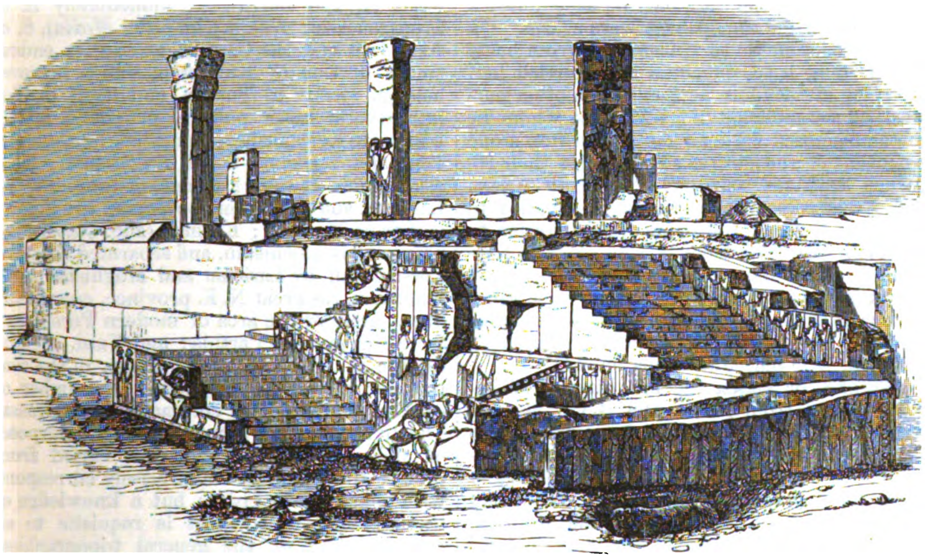
PERRY. I. Christopher Raymond, an American naval officer, born at South Kingston, R. I., in 1761, died in Newport, June 8, 1818. He was a sailor from his early boyhood, served in privateers during the revolutionary war, and was for several months imprisoned in the Jersey prison ship. On the declaration of peace he entered the merchant service; but when troubles with France appeared imminent he was appointed post captain in the regular navy (June, 1798), and served until the reduction of the naval forces in the early part of 1801, when he was appointed collector of Newport. He married in 1784 Sarah Alexander; and of the large family descended from these parents almost every male member has served with distinction in the navy. **II. Oliver Hazard,** an American naval officer, son of the preceding, born in Newport in August, 1785, died at Port Spain, island of Trinidad, August 23, 1819. He entered the navy as a midshipman in 1799, and was first in active service under the command of his father in the frigate General Greene, 28, which performed an active and important cruise on the West India station during 1799 and 1800. In 1807 he was promoted to the rank of lieutenant, and in 1809 was in command of the schooner Revenge, 14, and cruised actively on the coast of the United States until January, 1811, when the Revenge was wrecked upon Watch Hill reef near Stonington, Conn. A court of inquiry acquitted Lieut. Perry of all blame. At the opening of the war of 1812 he was in command of a division of gunboats at Newport, and in February, 1813, he was transferred at his own request, with a portion of his officers and men, to the command of Commodore Isaac Chauncey on the lakes. In March he was ordered by Commodore Chauncey to superintend the equipment of a naval force on Lake Erie, and while thus employed at the port of Presque Isle (now Erie), he was called away to aid in an attack on Fort George. He coöperated ably with the army in that affair, at the head of a body of seamen. In August Perry, taking advantage of the momentary absence of the British squadron which had been watching him, succeeded in getting the force which he had equipped out of the port by lifting the larger vessels on "camels," and, though very deficient in officers and men, and imperfectly prepared, brought the British squadron to an engagement on Sept. 10, which resulted in the complete success of the American arms. (See Erie, Battle of Lake.) After this he coöperated with the army of Gen. Harrison by assisting in regaining possession of Detroit, in transporting troops, and serving at the battle of the Moravian Towns. At the close of the operations of 1813 he gave up his command. Congress voted him a gold medal, and he was promoted to the rank of captain, his commission being dated Sept. 10, 1813. In August, 1814, he was appointed to the Java, 44, a new frigate under equipment at Baltimore; but as the Chesapeake was closely blockaded, it was impossible to get her to sea, and Perry, with his officers and men, was actively employed in annoying the British squadron in their descent of the Potomac from Alexandria, and in the defence of Baltimore. In March, 1819, he was appointed to the command of a squadron for the coast of Colombia, sailed on June 7, and in July ascended the Orinoco to Angostura. On leaving the river he was seized with yellow fever, which terminated fatally the day his vessel arrived at Port Spain. A few years later his remains were transferred to his native place. In September, 1860, a marble statue by Walcutt was erected, with imposing ceremonies, at Cleveland, Ohio, to the memory of Commodore Perry. **III. Matthew Calbraith,** an officer of the United States navy, brother of the preceding, born at South Kingston, R. I., in 1795, died in New York, March 4, 1858. He entered the navy as a midshipman in 1809, served under Commodores Rodgers and Decatur, attained the rank of captain in 1837, and afterward commanded the navy yard at Brooklyn, the squadron on the coast of Africa, and during the Mexican war the squadron in the gulf of Mexico. In March, 1852, he was appointed to the command of the Japan expedition, which resulted in the important treaty of 1854 with that country.—See "Report of Perry's Expedition to Japan," published by the government (3 vols. 4to, Washington, 1856).

PERSANO, Carlo Pellion, count, an Italian admiral, born in Vercelli, March 11, 1806. He entered the navy in 1824, commanded a squadron in the war of 1859, and in 1860 became vice admiral and a member of parliament. In 1862, while minister of marine under Rattazzi, he received the full rank of admiral. In 1865 he was made a senator, and in May, 1866, shortly before the outbreak of the war with Austria, commander-in-chief of the Italian navy. He had 34 vessels, while the Austrians had less than half as many; but he remained inactive at Ancona until urged to open hostilities, and then he moved only against the Austrian island of Lissa, on the Dalmatian coast, which was strongly fortified and almost impregnable. Despite his numerical superiority, he was defeated by Tegetthoff in his attempt to take the island (July 20), and was arrested and impeached for treason, cowardice, disobedience, and incompetency. The last two charges being sustained by large majorities (April, 1867), he was sentenced to pay the cost of the trial and to lose his rank as admiral.

PERSEPHONE. See Proserpine.

PERSEPOLIS (Gr., "city of the Persians;" Pers. *Istakhr*), one of the ancient capitals of Persia. It stood 35 m. N. E. of Shiraz, on a spacious plain now called Merdasht, near the confluence of the Medus and the Araxes (now

Pulvar and Bendamir). The plain is naturally one of the richest and most beautiful in the world, and is surrounded by lofty mountains. The remains usually spoken of as the ruins of Persepolis are only those of great palaces situated at a considerable distance from the city. Few traces remain of the capital itself. The group of ruins at the foot of one of the mountains, projecting somewhat beyond the line of the range into the plain, is called by the natives Tchihil Minar, forty columns, or Takht-i-Jemshid, Jemshid's throne. The principal feature is the massiveness of the substructure on which the buildings stood. It is a platform 1,500 ft. long and 936 ft. wide, supported on three sides by walls, the fourth side abutting on the hills. Of the three terraces which compose this platform, the central is the longest and highest, being over 40 ft. high, and measuring 770 ft. in the front. A staircase over 20 ft. wide, and consisting of two flights of broad and low stone steps that can easily be mounted on horseback, leads to the surface of the platform. Two smaller staircases on the north and south are richly decorated with sculpture. On the northern terrace stand two colossal bulls of an Assyrian type, which once flanked a propylæum 12 ft. wide and over 30 ft. high. Save two fluted pillars 60 ft. high, the hall to which the propylæum gave entrance has entirely disappeared. The great central terrace still bears many fragments of the buildings once standing on the platform. The staircase leading to it is elaborately ornamented with sculptures of chariots drawn by horses, and long rows of warriors, captives, priests, and kings, representing a triumphal procession. Some of the bases of columns and three pillared porticoes formed the great hall of Xerxes. The dimensions of a similar construction, called the "hall of a hundred columns," can also be traced; and the remains of four palaces lie upon the platform, which have been identified as the residences of Cyrus or Cambyses, Darius, Xerxes, and Artaxerxes Ochus. While the ornamentation of the first two palaces consists principally of representations of the kings engaged in combat with lions and monsters, the sculptures of the other two exhibit only scenes of the luxurious life at court. Back of the ruins are seven rock-cut tombs, but only one, that of Darius Hystaspis, has an inscription. The most interesting relics of the capital itself, about 2 m. N. of the remains just described, are several enormous blocks, which perhaps formed part of one of the city gates, or of a fortified gate like those described by Xenophon. Only one pillar remains erect of a palace, but from the bases of others, and from the traces of the wall, it may be inferred that the Istakhr palace closely resembled the buildings on the platform. Persepolis took the place of Pasargadæ, the more ancient capital of Persia proper, from the time of Darius Hystaspis. According to Strabo, in the later times of the empire it was next in rank to Susa, the richest of all Persian cities. It was wantonly destroyed by Alexander the Great in 331 B. C., and after the time of Antiochus Epiphanes it disappears from history. For the inscriptions found at Persepolis, and their decipherment, see CUNEIFORM INSCRIPTIONS, vol. v., p. 574. —See Fergusson, "Palaces of Nineveh and Persepolis Restored" (London, 1851); Rawlinson, "The Five Great Ancient Monarchies"



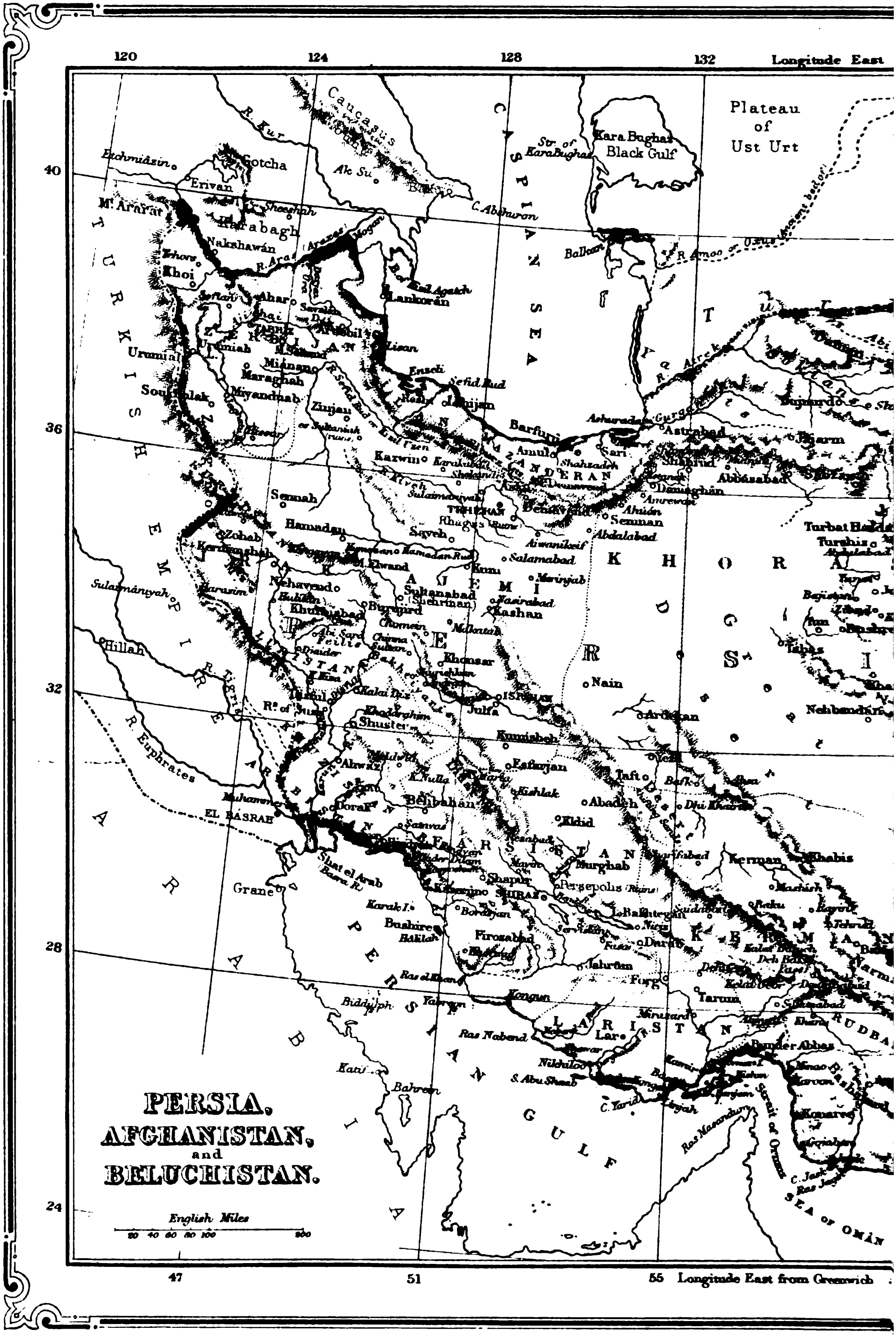
Stairs of Palace of Xerxes, Persepolis.

(vol. iii., 2d ed., London, 1871); and P. V. N. Myers, "Remains of Lost Empires" (New York, 1875).

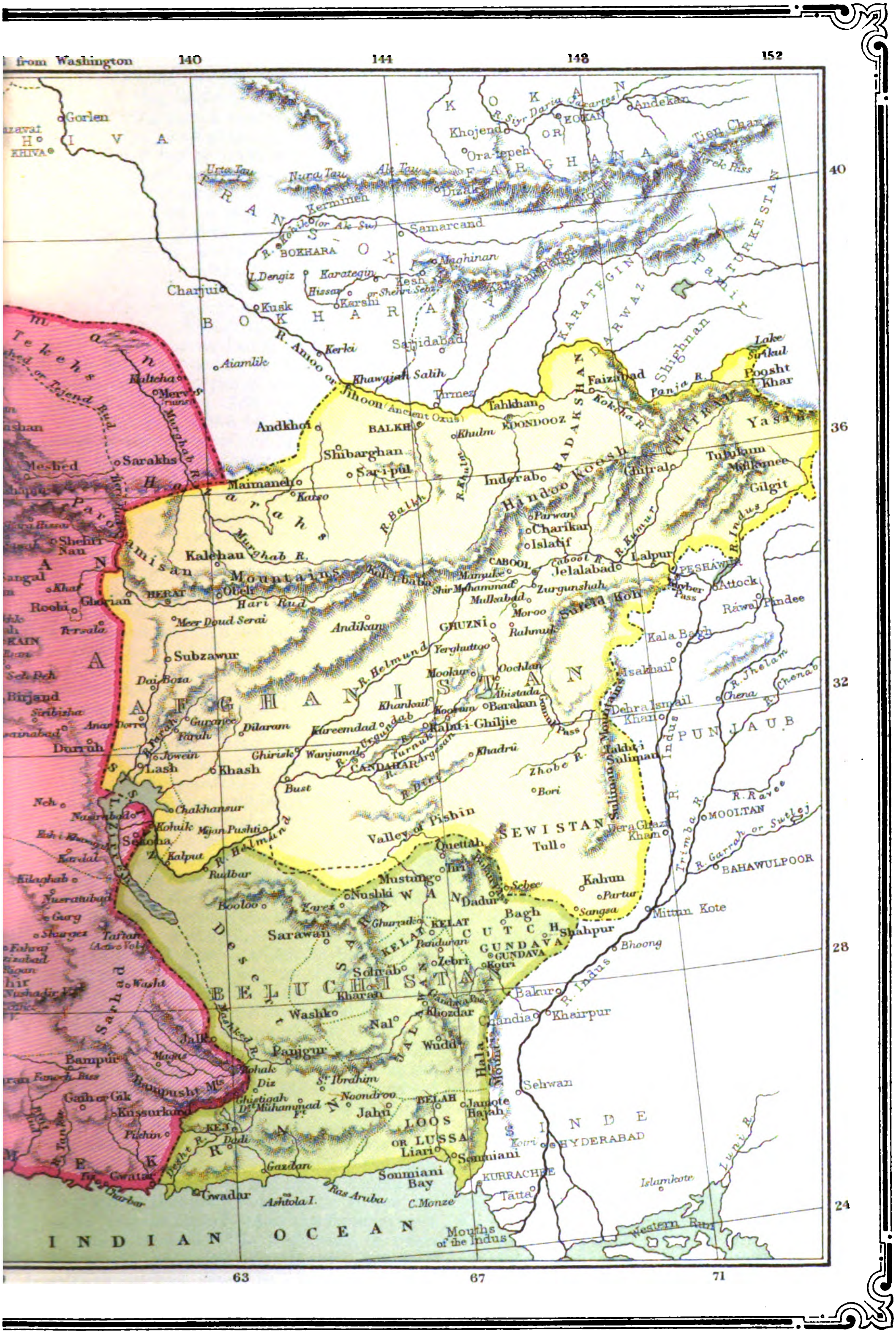
PERSEUS, a Grecian legendary hero, the son of Jupiter and Danaë. Acrisius of Argos, the father of Danaë, having been warned that his daughter's son would cause his death, ordered the mother and child to be placed in a chest and cast adrift at sea. The chest floated to the island of Seriphus, where Perseus was brought up by King Polydectes; but the latter conceiving a passion for Danaë, and desiring to rid himself of her son, sent him to fetch the head of the gorgon Medusa. Having obtained from the nymphs winged sandals to bear him through the air, a magic wallet, and the helmet of Pluto which rendered him invisible, from Mercury a sickle, and from Minerva a mirror in which he could see the reflection of Medusa, since a sight of the monster herself would change him to stone, he accomplished his errand while the gorgons were asleep. On his way back he saved Andromeda from being devoured by a sea monster, and married her. Arriving at Seriphus, he found his mother pursued by the violence of Polydectes, whom he metamorphosed with all his guests into stone by means of the gorgon's head. He then returned with his wife and mother to Argos, and Acrisius, remembering the oracle, fled to Larissa. Perseus, following him in order to persuade him to return, is said to have accidentally killed him with a discus. Unwilling to return to Argos, he exchanged that kingdom with Megapenthes for the government of Tiryns. He presented the gorgon's head to Minerva, who placed it on her shield.

PERSEUS, or **Perses**, the last king of Macedon, reigned from 179 to 168 B. C. He was the son of Philip V., whom he persuaded to put to death a younger son Demetrius, suspected of ambitious designs. Immediately upon his accession he confirmed the treaty concluded by his father with the Romans, but began secretly to prepare for war, and endeavored to form alliances with the states of Greece. Hostilities were hastened by an attempt of Perseus to assassinate Eumenes, king of Pergamus, who had reported to the senate the warlike preparations of the Macedonians. The senate pronounced Perseus an enemy of the republic (172), and the consul P. Licinius Crassus was sent with an army to invade his dominions. The war lasted four years, mostly with disadvantage to the Romans; but at last the avarice of Perseus alienated his allies, and on June 22, 168, he was signally defeated near Pydna by the consul L. Paulus Æmilius. He took refuge in Samothrace, where he surrendered, and in the following year was carried to Rome. Paulus Æmilius, whose triumph he adorned, treated him kindly, and when he was afterward cast into a dungeon by order of the senate, procured his removal to a place of honorable captivity to Alba, where he died after a few years.

PERSIA (Pers. *Iran*), a country of western Asia, extending from Turkey eastward to Afghanistan and Beloochistan, and from the Caspian sea southward to the Persian gulf. The western portion of its northern boundary is formed by the Russian territory of Transcaucasia, and the eastern portion by Khiva, with the Caspian between them; the S. E. corner of the kingdom borders the gulf of Oman in the Arabian sea. Persia lies between lat. 25° 30' and 39° 50' N., and lon. 44° and 62° E.; greatest length, from N. W. to S. E., 1,200 m.; greatest breadth, 850 m.; area, about 600,000 sq. m. These dimensions are only approximate, as the country has not been surveyed, and the E. boundary is not precisely defined. The principal provincial divisions of Persia are as follows: Ghilan, Mazanderan, and Astrabad, in the north, between the Elburz mountains and the Caspian sea; Azerbijan, in the northwest, immediately S. of Transcaucasia; Irak-Ajemi (anc. *Media*), S. of Azerbijan and the Caspian territories, embracing a portion of Kurdistan, which however belongs mostly to Turkey, and itself divided into several lesser political provinces, among which are Kermanshah, Hamadan, Ispahan, and Teheran; Luristan, S. of Irak-Ajemi; Khuzistan (anc. *Susiana*), Farsistan (anc. *Persis*), Laristan, and Moghistan, bordering the Persian gulf from W. to E.; Kerman (anc. *Carmania*), adjoining Beloochistan, and separated from the Persian gulf by Laristan and Moghistan; and Khorasan, the great N. E. province, comprising one quarter of the area of modern Persia, and including ancient Parthia; and Yezd, occupying the S. W. corner of Khorasan, in the central portion of the kingdom. A number of smaller provinces are embraced in Khorasan. The divisions of the monarchy for the purposes of political administration are varied from time to time, and do not precisely correspond with those above given; but a knowledge of these principal provinces is requisite to an understanding of the general topographical features of the country.—Persia is for the most part an elevated mountainous plateau, rising 3,000 or 4,000 ft. above the sea, bounded on all sides except the east by lofty ranges, preëminent among which is the mighty chain of the Elburz. This great range, striking off from the Caucasus, enters the kingdom at the N. frontier, which it covers with a gloomy mass of black peaks, and from Azerbijan runs parallel with the S. shore of the Caspian sea to Astrabad. Thence it passes in an easterly direction to the north of Meshed into Afghanistan and Turkistan. Its loftiest peak, Mt. Demavend, N. E. of Teheran and about 40 m. S. of the Caspian, attains a height of more than 18,000 (according to recent surveys upward of 20,000) ft. above the sea. An offshoot of this range, called the Sahund mountains, forms a prominent cluster immediately E. of Lake Urumiah, in Azerbijan, and extends in various directions through that prov-



PERSIA, AFGHANISTAN, and BELUCHISTAN.


from Washington
140
144
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KOKAN
FARGHANA
Khojend
Ora-tepeh
Kokan
Andekan
Tien Chan
Terek Pass
Nura Tau
Ak Tau
Urta Tau
Dizak
Kerminèh
Samarcand
R. Kohik (or Ak Su)
BOKHARA
TRANS OXIANA
Maghinan
L. Dengiz
Karategin
Hissar
Kesh or Shehri Sebz
Karshi
Charjui
Kusk
BOKHARA
R. Amoo or Jihoon (Ancient Oxus)
Kerki
Aiamlik
Sabidabad
Khawajah Salih
Tirmez
Tahkhan
KARATEGIN
DARWAZ
Shighnan
Pamir
TURKESTAN
Lake Sirikul
Poosht Khar
Faizabad
Panja R.
Kokcha R.
Andkhoi
BALKH
KOONDOOZ
Khulm
BADAKSHAN
CHITRAL
Yassin
Tululum
Mulkunee
Gilgit
Shibarghan
Sar-i-pul
Chitral
Inderab
Hindoo Koosh
Maimaneh
Kaisoo
R. Balkh
R. Khulm
Parwan
Charikar
Islalif
Hazarahs
Murghab R.
Kalehau
Paropamisan Mountains
Koh-i-baba
CABOOL
Caboot R.
Jelalabad
Lalpur
PESHAWUR
Khyber Pass
Attock
Rawal Pindee
R. Indus
R. Kamur
HERAT
Obeh
Hari Rud
Shir Muhammad
Zurgunshah
Mullabad
Maimuke
Moroo
Sufeid Koh
Meer Doud Serai
Andikan
GHUZNI
Rahmut
Kala Bagh
Isakhail
Subzawur
Yergluttoo
R. Helmund
Mookur
Oochlan
Abistada
Baraken
Gomul Pass
Dai Boza
AFGHANISTAN
Khankail
Kooram
Kalat-i-Ghiljie
Dehra Ismail Khan
PUNJAUB
R. Jhelam
Chena
R. Chenab
Gurance
Farah
Dilaram
Kureemdad
R. Urgundab
R. Farah
Jowein
Lash
Khash
Ghirisk
Wanjunai
Turnuk
CANDAHAR
Argesan
Khadrü
Zhobe R.
Bori
Takht-i-Suliman
Suliman Mountains
Indus
Bust
R. Dori
R. Ravee
MOOLTAN
Chakhansur
SEISTAN
Nadali
Kohuik
Majan Pushti
Sekoha
Valley of Pishin
SEWISTAN
Tull
Dera Ghazi Khan
R. Garrah or Sutlej
Trimba R.
BAHAWULPOOR
Kalput
R. Helmund
Rudbar
Quettah
Tiri
Bolan Pass
Mustung
Sebee
Kahun
Purtur
Sangsa
Mittun Kote
Nushki
Dadur
Booloo
Zarat
Ghurab
KELAT
SARAWAN
Bagh
CUTCH GUNDAVA
Shahpur
Sarawan
Panduran
KELAT
GUNDAVA
Bhoong
Kotri
Zebri
Sohrab
Desert
BELUCHISTAN
Kharan
Bakur
R. Indus
Washk
Ghanpara
Khozdar
Chandia
Khairpur
Nal
JALAWAN
Wudd
Hala Mountains
Jalk
Panjgur
Mashked R.
Kohak
Diz
St. Ibrahim
Sehwan
Ghistigah
Pir Muhammad
Noondroo
MEKRAN
Jahu
BELAH
Jamote
Hajah
KEJ
Dasht R.
Dadi
LOOS OR LUSSA
SINDE
Liari
Sonmiani
Kotri
HYDERABAD
Gazdan
Sonmiani Bay
KURRACHEE
Islamkote
Luni R.
Gwadar
Ashtola I.
Ras Aruba
C. Monze
Tatta
Western Run
Mouths of the Indus
INDIAN OCEAN
Gorlen
KHIVA
KHIVA
Teheha
Tejend Rud
Kaltcha
Merv
Meshed
Sarakhs
Murghab R.
Hari Rud
Shehri Nau
Ghorian
Khaf
Rooi
KAIN
Turshiz
Birjand
Anar Dorre
Durruh
Nasirabad
Kerdal
Nusratabad
Tartan
Washt
Sarhad
Bampur
Bampusht Ms.
Gaih or Gik
Kussurkund
Pishin
Tanke
Gwattar
Charbar
MEKRAN
INDIAN

ince. Another branch is the Zagros range, which divides ancient Assyria from Media, and, splitting into a confused mass of ridges and valleys in Kurdistan, continues southward under the appellation of the Luristan and Bakhtiyari mountains along the western borders of the table land. In Farsistan, and thence eastward to the S. E. corner of the kingdom, the plateau is separated from the Persian gulf by several parallel ridges, from three to seven in number, crossed by barren valleys rising from the low shore into the interior. From the principal ranges we have mentioned run a multitude of branches that cover the surface of Persia with a network of rocky lines, and it has been said that in the vastest of Persian plains one is never out of sight of mountains. Salt deserts occupy probably two thirds of the Iranian table land, and many of them are covered by a saline efflorescence which glitters brightly in the sunshine. The Great Salt desert, the most extensive of these tracts, lies in the centre of the country, and is 400 m. in length and 250 m. in breadth. The nature of this desert varies in different places. In some the surface is marshy; in others it is dry and produces a few plants such as prefer a salt soil; and over considerable tracts sand predominates, which in places is so light and fine as to be extremely dangerous to travellers, who are sometimes overwhelmed and buried in the drifts raised by the wind. Inhabited oases dot the desert, though there are none of great extent. Throughout the remainder of the plateau the soil is of good quality and productive wherever it is well watered. The arid climate and the absence of artificial irrigation, however, combine to give a brown, barren, and monotonous aspect to the country generally. In the spring a light herbage makes its appearance on the plains, but rapidly withers away under the heat to which they are exposed during ten months of the year. But wherever moisture is present, either naturally or by artificial means, the country is exceedingly fertile. Among the more favored regions are the beautiful plains which lie between the mountains of Azerbijan; the rich valleys at the southern base of the Elburz range, which are clothed with verdure throughout the year; and the celebrated garden district of Shiraz, near the southern termination of the table land. The coast provinces of the Caspian, from 10 to 50 m. in width, and the plain about equally broad along the shores of the Persian gulf, constitute the northern and southern lowlands of Persia, between which there is a striking contrast. In Ghilan, Mazanderan, and Astrabad, the country is abundantly supplied with water, the climate is hot and moist, and the luxuriance of the forest growth is almost tropical. The Deshtistan, or warm region of the south, is a burning waste of sand throughout almost its whole extent, with only an occasional patch of vegetation to relieve its utter aridity.—The coast line of Persia measures about 800 m. on the Persian gulf and the gulf of Oman, and 400 m. on the Caspian. The principal gulf port is Bushire, the terminus of the submarine telegraph cable from Kurrachee, in lat. 29° N., lon. 50° 58′ E., through which nearly all the Persian trade with India is carried on. The only other harbor on the S. coast of any importance is Bunder Abbas, or Gombrun, on the strait of Ormuz. The Caspian ports are Enzeli, near Resht, the capital of Ghilan, which is visited once a fortnight by Russian steamers from the Volga, and Meshedi Sar, the seaport of Balfrush in Mazanderan.—The deficiency of rivers in so vast a country is still more remarkable than the small number of good harbors, for there is scarcely a navigable stream in the whole kingdom. In the north the rapid Aras (Araxes) separates Azerbijan from Transcaucasia, and E. of the Caspian the river Atrek flows between the khanate of Khiva on one side and Astrabad and Khorasan on the other. These can scarcely be classed as strictly Persian rivers, being only boundaries of the kingdom. While the greater part of Persia suffers from want of water, the northern provinces bordering upon the Caspian sea are as remarkable for the multitude of their streams, although many of them are mere torrents, full in winter and nearly drying up in summer. The largest river in this region is the Sefid-rud, which drains the mountainous district E. of Lake Urumiah by means of its chief affluent, the Kizil-Uzen, and pours into the Caspian sea through the province of Ghilan. In the basin of the Tigris, the principal Persian streams are the Karun, with its head waters in the Bakhtiyari range, and the Kerkha, from the mountains of Persian Kurdistan. These rivers flow nearly parallel through Khuzistan, and both unite with the Shat-el-Arab, the Kerkha about 50 m. above the Karun. The principal cities and towns of Persia are situated upon the banks or in the immediate vicinity of streams, where the greatest fertility prevails; but few of these streams are of any commercial importance as highways of communication, as many of them never reach the sea, but are absorbed in the sands of the desert. A striking characteristic of Persian topography is the number of salt lakes. The largest is Lake Urumiah in the W. part of Azerbijan, between lat. 37° 5′ and 38° 15′, at the height of 4,300 ft. above the sea. It is about 90 m. long, from 20 to 30 m. broad, and 12 ft. deep on an average. Although its waters are clear, one fourth of their weight is made up of saline matter in solution. The lake is fast drying up, and is bordered by large tracts covered with salt. Another great salt lake, next in size to this, is Bakhtegan in the E. portion of Farsistan, directly under the 54th meridian; it is about 70 m. long and 8 m. wide.—Comparatively little is known of the geology of Persia. A primitive character is attributed to the Elburz range, in which are found porphyry colored with chlorite, and compact feldspar with green earth along the beds of the torrents, whose waters also bear evidence of the existence of chalk within the mountains. The branches of the great chain are geologically described as consisting of calcareous substances on their eastern skirts, schistose rocks on their southern acclivities, clay intermingled with quartz in the middle and higher altitudes, and granite in the lower tracts of their northern aspects. The table land of Azerbijan is essentially volcanic, and traces of volcanic action are visible in various parts of the Elburz range. The peak of Demavend is an extinct volcano; and the frequent earthquakes in the vicinity of the mountains indicate the existence of subterranean fires over a wide-spread region. There are hot sulphur springs at Ask in Mazanderan, S. of Mt. Demavend. The Sahund mountains exhibit great masses of calcareous conglomerate resting on a base of granite. Their summits are composed of porphyry, sometimes containing crystals of glossy feldspar and hornblende. Some of the lower hills intervening between these mountains and Tabriz are covered with blocks and pebbles of a dark blue rock containing calcareous matter. The soil of the Great Salt desert is a stiff clay overlaid with a saline efflorescence, in some places to the depth of an inch. Southern Persia appears to have undergone a gradual elevation, from a period long antecedent to historical times, converting into lakes the streams which formerly flowed to the Persian gulf. The mineral products comprise iron, copper, lead, and antimony among the metals, and salt, sulphur, marble, and coal. Extensive coal fields have been discovered near the city of Casbin on the route between Teheran and the Caspian sea; there are also mines in the Elburz, N. of the capital, from which coal is brought to the city, where it is sold for $10 to $15 a ton. Bitumen and naphtha are obtained in various parts of the kingdom. The turquoise is the principal precious stone produced in the country. The turquoise mines are near the village of Madene, about 32 m. from Nishapur in Khorasan, where they have been worked for many centuries, and yield remarkably fine specimens. The base of the ridge where they lie is composed of white, gray, yellow, red, and brown porphyritic earth, interspersed with veins of brilliant red, disposed in hillocks, on the top of which rest beds of limestone or porphyritic conglomerates. The mines are opened in beds of porphyritic earth or rock, deeply tinged with iron, through which the turquoise is disseminated in veins, nodules, and irregular masses. They are let out by the government.—The modifications of climate in Persia are largely dependent upon the varying elevation of the surface. Comparative warmth throughout the year is characteristic of the low strips along the coast, on the Caspian as well as on the Persian gulf, while the great interior plateau is known to the natives as Sirhud or the cold region. Here the winter lasts from the first or middle of December to the middle of February; the fall of snow is always considerable and sometimes heavy, and severe cold prevails. On the other hand, the heat of summer is intense, so that the climate of the table land is only really enjoyable during the spring and autumn months, which are described by European travellers as truly delightful. At Teheran spring begins in the latter part of March and extends to the middle of May. In July the temperature rises to 97° indoors throughout the day, and all who can do so retire at that season into the cooler regions of the country; they return toward the first of October, when autumn begins, continuing two months. The shah spends the summer under canvas on the slopes of the Elburz. In the hot weather the nights are clear, bright, dry, and comparatively cool, and the people are then in the habit of sleeping on the housetops. Ispahan is one of the healthiest Persian cities for a summer residence. At Shiraz May is the pleasantest month of the year, but after the middle of June the thermometer there commonly indicates 100° in the shade, and frequently rises to 110°. In the low lands on the Persian gulf the heat of summer is increased by the winds from the sandy deserts with which this region abounds, but the winter and spring are delightful. Notwithstanding the great extremes of the climate of Persia, and the sudden transitions from heat to cold, it is very healthy, with the exception of the low coasts of the Caspian, where from the superabundance of moisture and of vegetation fevers are prevalent. The annual rainfall is small, and appears to have been decreasing during many centuries. A register kept at the British legation in Teheran in 1867 showed that snow or rain fell there on 49 days in the first six months of that year, but that on 34 of these days the fall was only a few drops or a slight shower. The second half of the year is usually still dryer.—Trees are very scarce in the greater part of Persia, but the mountain slopes of the Caspian provinces are heavily wooded with valuable timber, including oak, ash, elm, beech, fir, and walnut. The juniper grows in this region, and the box tree attains a height of from 20 to 30 ft. Olive plantations thrive in the valleys, and in the lowlands the fig, the grape, and the pomegranate grow wild, amid mimosas and lofty oaks. The arborescent vegetation of the elevated plains consists mainly of thorny bushes, acacias, the terebinth, the tamarisk, and the jujube. The mountains of the plateau are comparatively treeless, though there are forests of oak on the ranges in Laristan; and there are vast tracts where the only trees to be seen are in the neighborhood of villages and along the banks of streams, or in the oases, where the date palm is usually a prominent feature of the landscape. The liquorice plant is found in profusion on the plain of Merdesht and near Shiraz, where the chenar, oak, and cypress are the commonest trees. The oriental plane tree, the wild almond, the hawthorn, and tree roses grow in many of the valleys; and further S. in Farsistan, near Kazerun, are grassy prairies dotted with myrtle, oleander, and locust trees, and in the summer bright with flowers. The well watered gardens in the vicinity of large cities present the Persian flora in its richest and most varied aspect. Here grow delicious fruits and beautiful flowers; among them, apples, pears, peaches, cherries, apricots, quinces, oranges, lemons, limes, shaddocks, pomegranates, and melons which are unsurpassed elsewhere in the world; roses in wonderful profusion, lilies, hyacinths, marigolds, geraniums, scarlet, white, and lilac poppies, and other ornamental plants without number. From its relation to the silk culture, the mulberry, which grows abundantly in the provinces on the Caspian, must be ranked first in importance among the fruit products of Persia. —Notwithstanding the generally barren appearance of the land, the cultivated soil of Persia wherever it is supplied with moisture is exceedingly fertile. Small streams and canals are valued at high rates and produce extraordinary rents. A simple form of the plough, the harrow, and a flat board upon which a man stands while it is drawn over the soil, are the ordinary implements of cultivation, and a rude form of threshing machine is in common use. The principal Persian cereals are rice, wheat, barley, and maize, the wheat being of excellent quality. Cotton is produced in sufficient quantity to supply the wants of the people; and the production is capable of being largely increased. It thrives in the Caspian provinces, in which a considerable crop of sugar is also grown; and the mulberry of the same region supports the extensive silk industry there carried on. Where the irrigation is plentiful two crops can be raised in a year, the first being sown in summer and the second in the autumn. Clover and lucerne are cultivated in some localities. The fruits already mentioned are grown in great abundance and perfection, especially the melon, of which the finest crops are produced in the neighborhood of Ispahan. The vine flourishes in several provinces, and the grapes and the wine of Shiraz are celebrated in the poetry of the East. This wine is powerful and somewhat astringent, and is not so agreeable to European taste as the lighter wines produced in Hamadan. The grape is also cultivated for raisins as well as wine making. Dates are largely used as food, and those of Dalaki in Farsistan are particularly celebrated for richness and flavor. The tobacco of Shiraz is famous throughout Persia, and a large yield of opium is obtained from the extensive poppy fields in the same district. The field cultivation of roses for making rose water is an important and peculiar branch of Persian agriculture. Among the native vegetables are the bean, the cabbage, the gourd, and the turnip; saffron, henna, and madder are produced in many places; and Persia contributes several useful gums to medicine, including gum tragacanth, gum ammoniac, and asafœtida. Considerable quantities of honey are made in some districts.—According to W. T. Blanford, the whole of Persia is zoölogically divisible into three principal regions: 1, the woodlands of the Caspian provinces and western Persia, where the fauna is chiefly European, and embraces the animals of southern Europe, with a few additions such as the tiger in the coast country, and several peculiar forms of birds; 2, the great plateau, where there is a mixture of desert forms, such as the gazelle and the wild ass, with palæarctic types like the wild cat, the wolf, and the Syrian bear; 3, southern Persia, where the desert and Indian types prevail. It is in this last region that the lion is found. In addition to those mentioned, the animals of the desert include the wild hog, fox, hare, jackal, hyæna, moufflon, and antelopes and deer in great variety. The wild ass, which is exceedingly shy and fleet, is a favorite object of pursuit by Persian huntsmen; the moufflon is also hunted, as well as antelopes, which are usually pursued with the swift Persian greyhound. Birds are by no means so rare as might be expected from the treeless character of much of the country. Pheasants are numerous N. of the Elburz range; crows, mews, ducks, and cranes frequent the Caspian coast; pelicans and bustards are found on the shores of the Persian gulf; and among the birds of the table land are enumerated the lammergeyer, owls, wild pigeons, snipe, sand grouse, partridges, jays, flycatchers, wrens, swallows, the raven, the magpie, the blackbird, and the true nightingale. But little is known of the herpetology or the insect life of Persia; there are leeches and snakes in the Caspian provinces, immense swarms of locusts occasionally pass over the plains of the plateau, and the vicinity of Persepolis abounds with dragon flies and butterflies. The rivers contain few fish, although there are some fine trout streams in the mountains N. of Teheran, and valuable fisheries are carried on upon the shores of the gulf and the Caspian. The common domestic animals of the country are the camel, cow, sheep, goat, ass, horse, and mule. The native horses are hardy and powerful, and the breed has been much improved by intermixture with the Arab. The Turcoman horses are larger and stronger, and are remarkable for their powers of endurance; some of them will carry their riders for a week together at the rate of 100 miles a day. In the hot and arid desert camels are preferred as beasts of burden, though mules are much used among the mountainous regions.—The population of Persia has never been actually enumerated, but is estimated at about 5,000,000, consisting of 1,000,000 townspeople, 1,500,000 nomads, and 2,500,000 villagers. The principal cities are Teheran (pop. 120,000), the present capital of the country; Tabriz (120,000), the capital of Azerbijan and residence of the heir apparent to the throne; Meshed (70,000), in Khorasan, one of the holiest of Mohammedan cities; Ispahan (60,000), formerly capital of the kingdom and still its most stately city; Shiraz (40,000), also once the Persian capital, and architecturally one of the most attractive towns of the present day; Hamadan (40,000), the ancient Ecbatana; Yezd (40,000), in the province of the same name; Kermanshah (25,000), renowned for its manufacture of carpets; Lar and Kerman in the south; Shuster, on the river Karun, up to which that stream has been navigated; Resht and Balfrush, near the Caspian sea; and Bushire, on the Persian gulf. The entire number of villages is about 8,000, with an average of 300 inhabitants to each, although some have a population of 2,000. The nomadic tribes are known as Iliyats or Eeliauts. Some of these tribes have become stationary, and have devoted themselves to agriculture, though still preserving their union as tribe men; but the rest of them are wanderers, who with their families and flocks change their quarters each summer and winter in search of pasture to grounds more or less distant belonging to the tribe, and which cannot be encroached on by other clans. (See ILIYATS.) The tribes comprise four races, viz., Turks, Kurds, Leks, and Arabs. The first are invaders from Turkistan, who from time immemorial have established themselves in Persia, and who still preserve their language. The Kurds are not numerous in Persia, the greater part of the nation living in Turkey. They are supposed to be of Persian descent, and speak a dialect of the Persian language. The Leks are of genuine Persian blood, and are supposed to be descendants of the ancient inhabitants of the country. The Arab Iliyats are descended chiefly from the Mohammedans who conquered Persia in the 7th century, but they have lost their original language and become Persians both in speech and appearance. The Iliyats are inveterate robbers, and their turbulence has for several centuries been a frequent cause of internal disturbance. Among the leading nomadic tribes are the Ilkhani of the Kashkai mountains in N. Azerbijan, who have from 25,000 to 30,000 tents; the Sheghaghi, also of Azerbijan, 15,000 tents; the Kelhor of Kermanshah, 11,000 tents; and the Zengeneh, 10,000 tents; there is an average of five or six persons to a tent. The lesser tribes are probably 100 in number. The occupations of the wandering families when at peace are principally pastoral, and they live on the produce of the flocks and and herds. Black bread, sour milk, and occasionally a little meat form their food. The number of those who move in a body depends on the extent of pasture they can command. They encamp usually in the form of a square or street, the tent of the chief in the centre. When the pastures are bare they shift to some other spot. The nomads are monogamous. Their women do not, like other Mohammedans, veil their faces, but share the fatigues and the dangers of the men. They are bold and skilful riders, and can use the gun or the spear on an emergency. Among the settled inhabitants of Persia, the chief distinction of classes is into the courtiers, or the civil and military officers of the government; the citizens, comprising merchants, shopkeepers, artisans, men of learning, and of the religious orders; and lastly the peasants or cultivators of the ground. The Persians connected with the government are generally well informed, acute, polished in manner, lively, good-natured, and exceedingly self-possessed; but they are accused of being, with a few exceptions, deceitful, treacherous, and venal, and, where they can be so with impunity, arrogant and overbearing. The inhabitants of the towns are a mixed race of Turks, Tartars, Arabians, Armenians, and Georgians, engrafted on the stock of the ancient Persians. They are in general industrious, cheerful, polite, sociable, quick of apprehension, and, although mendacious and cunning, evince an aptitude for almost any employment and are remarkable for their powers of endurance. The merchants are numerous, and many of them are wealthy, though from fear of spoliation they do not often display their riches. Some of them are among the most cultivated men in the country. The ecclesiastical body, which includes the expounders of the written law, is very numerous, rich, and powerful, and consists of many orders, the highest of whom are called *mushtesheds*, and are seldom more than four or five in number. They rise to office by superior learning and sanctity, and their duties relate largely to the protection of the people against the oppressions of their rulers. The mollahs or common priests, who swarm in every city, have a very low reputation. The owners of land in Persia seldom cultivate it themselves, but let it to tenants, who divide the produce with the landlords. The peasantry suffer most from the rapacity and oppression of their rulers, but appear to be tolerably happy and contented. They display much industry and intelligence, and are kind and hospitable; their houses are comfortable and neat, and they and their families are generally well fed and clothed. Persian bread, which is rarely more than half baked, is made in the form of large thin flat cakes, and enters largely into the sustenance of the population, the meat supply being confined chiefly to the towns, where mutton and lamb are usually to be had, and occasionally beef. In addition to bread, eggs, chickens, and fruit are the ordinary articles of food throughout the country. A good deal of curded milk, called *yaourt* in Turkish, is consumed in some districts. The water is usually not very good. Many of the Persian women of the upper classes are exceedingly fair and beautiful, the frequent mixture of Georgian and Circassian blood having greatly improved the appearance of the native Persian race. They are lively and clever, and often acquire a great influence over their husbands, whose business affairs they sometimes direct and manage. There are two kinds of marriages: those which are permanent, in which the husband is restricted to four wives; and an inferior grade of marriage, in which the contract is made for a limited period, 90 years being the nominal maximum. The latter species of marriage may be contracted with an indefinite number of women, who are generally of an inferior rank and perform menial services for the proper wives. The children of both classes are regarded as perfectly equal in station and legitimacy. Among the great mass of the people a man has rarely more than one wife, and the condition of the women seems to be easy and comfortable. The ladies of the upper class lead an idle, luxurious, and monotonous life. Contrary to the common opinion in Christendom, they enjoy abundant liberty, as the Persians are not jealous in disposition, and their wives and daughters go about unattended to the public baths, the bazaars, and the houses of their friends. The complete envelopment of the face and person disguises them effectually from the nearest relatives, and, destroying when convenient all distinction of rank, gives unrestrained freedom. Women of the higher class frequently acquire a knowledge of reading and writing, and become familiar with the works of the chief Persian poets. These, however, are the best aspects of female life in Persia. On the other hand, it is certain that in the *anderuns* or harems of the rich there is often much cruelty and suffering, and the greatest crimes are perpetrated with impunity.—The fame of the more celebrated Persian cities for wealth and magnificence is by no means justified by their present condition. Few of them are well planned, handsomely built, or architecturally imposing, and such wealth as they contain is for the most part sedulously concealed by its possessors. Sun-dried bricks and mud mixed with straw are the usual materials of the walls by which the cities are surrounded, and of the low, flat-roofed, and irregularly built houses, without windows on the street, occupied by the large majority of citizens. At Teheran and in other cities, however, the dwellings of the rich and powerful, as well as some of the bazaars, are built of stone or kiln-dried bricks, and glazed with tiles. The public buildings, in addition to the palaces at Teheran and Ispahan, are mosques, bazaars, baths, colleges, caravansaries, and post houses. Most of the mosques are small, and surmounted with domes, minarets being much less frequently seen than in Turkey; many of them are handsomely decorated with tiles. The better class of bazaars are high, spacious, and among the most attractive buildings in a Persian city. There is great uniformity in the appearance of the caravansaries, which present four lofty blank walls on the exterior, with a parapet above; the interior is a courtyard surrounded by vaulted recesses, and also enclosing stables for the horses of travellers. The post houses are similar in plan of construction, the wall being overlooked by a tower at each corner. From what has been said, it will be understood that the view of a Persian city from the exterior is usually monotonous and uninteresting. With few exceptions, the only relief to the monotony of the view is afforded by the gardens, which are planted with forest and fruit trees, and to a greater or less extent are seen near all the towns of Persia. Few of the streets within the walls are broad enough to permit the passage of wheeled carriages, and all are unpaved, broken up into heights and hollows, and invariably either dusty or muddy. The uninviting aspect of the outside of a Persian house is not a just indication of the state of the interior. The dwellings are generally comfortable, and those of the richer classes are often of great size and contain very handsome and commodious apartments. The interior court is entered through a narrow corridor from the street, and usually contains a small flower-bordered water tank. Simple blank walls enclose two sides of the court; the other two sides, opposite one another, are occupied by the two distinct buildings which make up the house, one being devoted to the use of the master and the men in his household, and the other being the harem. Each consists of a large saloon, separated from the courtyard by glass windows, with two smaller apartments on the ground floor, and a balcony chamber above. The flat roofs are reached by an uncovered flight of steps, and are places of frequent and favorite resort in the warm season after nightfall. In winter many dwellings are heated with jars of charred fuel half buried in the floor.—Persia, having been from the remotest ages the seat of civilization and the scene of great political vicissitudes and revolutions, abounds in ruins, of which the oldest and most remarkable are those of Persepolis and Istakhr (see Persepolis), and the supposed remains of Pasargadæ (see Pasargadæ). In the mountains which form the N. boundary of the plain of Kermanshah is the precipitous rock of Behistun, with sculptures and inscriptions which have attracted much attention from the learned. (See Behistun.) At Shahpur, 15 m. N. of Kazerun, and in many other parts of Persia, there are interesting ruins of the era of the Sassanian kings (A. D. 226–651).—The prevailing religion of Persia is Mohammedanism, which permanently supplanted the religion of Zoroaster in the 7th century. The Shiah form of the Mohammedan faith was established at the beginning of the 16th century, and has ever since retained ascendancy. The Shiahs deny that the first three caliphs were properly the successors of the prophet, and honor Ali, the kinsman and son-in-law of Mohammed, as the true heir to the caliphate, and his son Hussein as legitimately entitled to succeed him. The murder of Hussein by the caliph Yezid is still commemorated in the cities of Persia by the passion plays which constitute the most remarkable observance of Shiah Mohammedanism. The performance takes place in a large tent in the public square, and extends through ten acts, one for each day devoted to mourning in memory of the sad event which the drama celebrates. The growth of the philosophical faith known as Sufism has tended somewhat to the decline of the established religion, though many of its adherents endeavor to reconcile its peculiar tenets with Mohammedanism. The Sufis, including many of the higher classes, believe in an all-pervading divinity, whose essence is shared by mankind, who will ultimately be absorbed therein. They regard individuality as an illusion, and confess the fundamental oneness even of what seems most diverse, as of good and bad, of life and death. Their number is estimated at 300,000. Similar doctrines are professed by the Babis, or followers of Mirza Ali Mohammed, who proclaimed himself the Bab ed-Din or "gate of the faith," and excited a rebellion which resulted in his capture and execution (1850). Entire community of property is advocated by the Babis, and in this respect they differ from the Sufis. They are not very numerous. The Parsees, or Guebres as they are called in Persia, number only about 7,000, and like the Jews are subjected to the most intolerant restrictions by the government, which not only denies them the right to hold land, but prohibits them from the maintenance of schools or the practice of their religion. Gardening is their favorite pursuit in Persia. They are most numerous in and about Yezd, and there are about 1,000 at Kerman and a few in the capital and other large cities; but the sect is rapidly disappearing under religious persecution. The other religious denominations comprised among the inhabitants of Persia are the Jews, whose number is estimated at 16,000, and the Armenian and Nestorian Christians, whose numbers are considerable and nearly equal, but variously estimated. The Armenians have two bishops, one of whom is a Roman Catholic. The Nestorians, among whom the American Presbyterians maintain missions, dwell in and about the city of Urumiah, W. of the lake of that name.—The foreign commerce of Persia is comparatively small. Silk is the great staple, though horses, dried fruits, and drugs are sent to India; sheep, cotton, and woollen manufactures to Turkey; and grain and cotton goods to Russia. Opium, tobacco, gall nuts, and dried fruits are also exported. Owing largely to the manner in which it is wound, the silk is not of the best quality; and therefore, though it is the most important product of Persia, it is not well adapted to the European market. A large proportion of it is sent to Turkey and to Russia. The people have acquired great dexterity in its manufacture, and satins, sarcenet, brocades, velvets, and all kinds of striped silks are made exceedingly strong and durable, with brilliant colors. Other articles of manufacture and export are the richly colored and durable Persian carpets, of which the finest are made at Kermanshah, although there are excellent manufactories at Yezd and in S. W. Persia and Khorasan; shawls made of the fine hair of the goats of Kerman; and gold and silver brocades, printed cottons, firearms, swords, daggers, and various kinds of cutlery, made at Ispahan. There are weavers' factories at Shiraz, and the industrial products of that city and the surrounding district comprise earthenware, glass ware, damascened swords, and rose water. The internal trade is carried on by caravans, which bring from the countries E. of Persia muslin, leather, lamb skins, nankeen, china, glassware and hardware, precious stones, saffron, indigo, and spices. The trade on the Caspian sea is monopolized by the Russians, and employs 30 steamers; that on the Persian gulf is mainly in the hands of Armenian, Arab, and Indian traders. The imports from Europe comprise tea, sugar, broadcloths, cotton goods, jewelry, arms, cutlery, watches, and earthen, glass, and metal wares, and are exchanged for Persian products. The city of Tabriz is the centre of Persian trade with Constantinople on one side, and northern India, central Asia, and Beloochistan on the other. The estimated value of the goods annually exported from Persia is $7,500,000, against $12,500,000 worth of yearly imports. The carpets annually sent to Turkey alone are valued at $250,000. In 1873 the exports to Great Britain, consisting mostly of gall nuts, were valued at £10,991, and the imports from Great Britain, mainly cotton goods, at £46,853. The unit of Persian coinage is the toman, a gold piece worth about $2 30.—The lack of good roads is a formidable obstacle to any increase of commercial prosperity. The routes from Resht to Teheran and thence to Bagdad are in fair condition, and there are some good roads in the vicinity of the capital, over which carriages are used by the wealthier classes, and also near the holy city of Meshed; but with these and a few other exceptions, there are no highways in Persia. Since his visit to Europe in 1873, the reigning shah has granted two concessions for the construction of railways within his dominions: one between Enzeli and Teheran, a distance of 175 m., to be built by Baron Reuter; and the other, in the Russian interest, to extend 85 m. from Julfa on the Arras to Tabriz. The former has been revoked, and the enterprise has for the present been abandoned. One of the telegraphic lines from England to India traverses Persia from N. to S., passing through Teheran, Ispahan, and Shiraz to Bushire, whence a cable extends to Kurrachee in India.—Education, so far as the ability to read and write is concerned, is widely diffused in Persia, and all the large towns contain schools, in which the pupils are taught the Koran, a little Arabic, and something of the poetry of Hafiz and Firdusi. The mollahs or priests teach in the villages. There are colleges in the principal cities, where the higher branches of Persian learning are pursued. The studies are astronomy according to the Ptolemaic system, astrology, rudimentary chemistry, alchemy, logic, metaphysics, mathematics, including the geometry of Euclid, theology, and the Persian and Arabic languages. Shiraz is preëminently the collegiate city of the kingdom, as it contains ten colleges; the largest college is at Ispahan; and at the government college in Teheran instruction is given in French and English. Persian alchemists still seek the philosopher's stone, and astrology is a popular pursuit, no Persian undertaking any important affair without first consulting an astrologer, and endeavoring to ascertain a lucky day or hour for his enterprise. In knowledge of medicine the Persians are very deficient. They are totally ignorant of anatomy and unacquainted with the circulation of the blood, and their practice consists of little more than the administration of a few simple drugs, whose qualities they have learned by experience. The fine arts are little cultivated, as the Mohammedan faith prohibits representations of the human form, though of late years the prohibition is not very strictly regarded, and the royal palaces at Ispahan contain some tolerable attempts at painting battles and hunting pieces. The Persians are notably skilful in the illumination of manuscripts in gold and colors. Their knowledge of music is very limited. The only newspaper published in the country is the official government journal of the capital, a weekly known as the "Teheran Gazette."—The government of Persia is a pure despotism. The monarch, known as the shah, is uncontrolled by any constitutional or legal checks, and can put to death at pleasure any of his subjects. The governors of provinces and high officials of all kinds exercise in their respective jurisdictions nearly absolute power, and it is this despotism and the consequent insecurity of life and property that retards the advancement of the country in spite of the intelligence and enterprise of the people. Every morning the shah holds a public levee, at which complaints are heard and justice is administered in the form of reward or punishment. His principal minister or grand vizier is a personage of great power and influence, and receives a salary equivalent to $100,000 a year; but he is always exposed like the meanest subject to capricious punishments, and holds his life at the mercy of the monarch. Besides the chief minister, there are secretaries who preside over various departments of state and finance. Each province provides for the expenses of its own government, and also pays a fixed amount to the shah. The estimated revenue of his government in 1868 amounted to about $9,800,000, collected by imposts on cultivated lands, mills, watercourses, wells, and various domestic animals, and by import and export duties. The public expenditure in the same year was about $8,500,000, so that the administration is economical; and there is no public debt. The crown jewels of the shah are believed to be the most magnificent collection of precious stones in the world. Their estimated value is from $30,000,000 to $35,000,000. The law, as in all Mohammedan countries, is founded upon the Koran and partly upon traditions. The civil law is administered by the mollahs or priests, whose decisions are generally affected by bribes or personal considerations. Criminal cases are referred to courts appointed by the state. The ordinary punishments are fines and floggings. Capital offences are punished by strangling, decapitation, or stabbing, and great offenders are sometimes tortured to death. The army has recently been reorganized and improved in many respects. It is nominally 200,000 strong, but probably could not muster more than 80,000 men, of whom 30,000 would belong to the regular infantry of the line, the remainder being made up of the guards, the cavalry, and the artillery. There are about 1,000 artillerymen, with 50 or 60 guns suitable for use in the field. The Persians make good soldiers, if commanded by efficient officers. A considerable number of Europeans hold positions in the army. The system of selling commissions has lately been abolished, and many of the troops have been furnished with new uniforms and improved weapons of European manufacture.—The earliest history of Persia is a mass of legends, mostly purely fabulous, though some doubtless have a basis of reality, in which figure many mythical dynasties. Mohammedan writers generally ascribe the foundation of the monarchy to the Peshdadian dynasty, which began with Kaiomurs or Gayomarth, included Tahamurs, the founder of Ispahan, and Jemshid, the founder of Persepolis, and ended with the overthrow of Afrasiab by the national hero Rustem, who placed Kai Kobad, the founder of the Kaianian line, on the throne in his stead. From the researches of recent European scholars it appears, however, that the true history of Persia, so far as it is authentically known, is as follows. At a very remote period a great Aryan migration from beyond the Indus entered Persia and Media, and continued for some centuries, until about the year 650 B. C. According to Rawlinson, the chief who first established an Aryan monarchy in Persia proper, or Persis, was probably named Hakhamanish (called by the Greeks Achæmenes), and became king there about a century before Cyrus, up to whose time the sovereigns of this monarchy were not independent, but maintained feudal relations with Media. Cyrus resolved to free Persia from Median subjugation, and rebelled. His success in the revolt, and the persistent attempts on the part of the Medians to quell it, led him to attempt greater conquests; and about 558 B. C. he was acknowledged as sovereign of the united nation of Medes and Persians, in which henceforth the Persians had the predominance. He conquered Asia Minor and Babylon with its dependencies Assyria, Susiana, and Syria, and founded a great empire, the dominant religion of which was Zoroastrianism. Ecbatana, Persepolis, Susa, and Babylon were its capital cities. At his death in 529 he was succeeded by his son Cambyses, who added Egypt and adjoining parts of northern Africa to the empire. During a tyrannical reign of seven years he committed great outrages, not only on the Egyptians, but on the principal men of Persia. Among others, he put to death on suspicion of treason his brother Bardius, whom the Greek writers erroneously call Smerdis. At length in 522, while he was yet absent in Egypt, the magians or priestly aristocracy brought forward one of their own number named Gomates, whom they imposed upon the people as the murdered Bardius, to whom he bore some personal resemblance. The people, disgusted with the tyranny of Cambyses, readily accepted the usurper as king; and Cambyses, on learning the news of the revolt, committed suicide according to the Behistun inscription, or according to the Greek writers died from a wound which he accidentally gave himself. After a reign of eight months the usurper was detected, and he was put to death by a conspiracy of Persian chiefs, one of whom, Darius Hystaspis, was made king. Darius, in a reign of 36 years, organized and considerably enlarged the empire, making extensive conquests in the east in the regions bordering on the Indus, and in the west carrying his arms into Europe and overrunning Thrace and Macedonia. In an attempt to subdue the Greeks his forces were completely routed at Marathon in 490. Four years afterward he died, and was succeeded by his son Xerxes, who renewed the invasion of Greece in person, and at first with a certain degree of success, but finally lost both his immense fleet and army at Salamis, Platæa, and Mycale, and was assassinated in 465. His successors were Artaxerxes I. (465–425); Xerxes II., who reigned 45 days, and was murdered by Sogdianus, who assumed the throne, and was himself slain about six months later; Darius Nothus, who reigned 19 years; his son Artaxerxes Mnemon, who succeeded him in 405 or 404, and overcame his brother and rival Cyrus in the battle of Cunaxa, September, 401; Artaxerxes III. (about 359–338), also known as Ochus, who was murdered by his chief minister and succeeded by his youngest son Arses, who had reigned but two years when he was slain by the same courtier; and Darius Codomannus (336–330), the last sovereign of the dynasty of the great Cyrus. Persia, which for two centuries had been the leading power of the world, with a dominion extending over an area of 3,000,000 square miles or more, parts of which were densely peopled, submitted to Alexander the Great, who invaded it in 334 with an army of 35,000 Greeks, and, after defeating the Persians in the great battles of the Granicus, Issus, and Arbela, became on the death of Darius the undisputed master of the empire. In the contest for the division of Alexander's dominions Seleucus Nicator finally became master of Persia in 312, and it was included in the kingdom of the Seleucidæ, which he transmitted to his successors Antiochus Soter and Antiochus Theos. In the reign of the latter, about 248, the Parthians, a tribe inhabiting the north of Khorasan, who from remote times had been subject to the Persians, revolted under Arsaces and founded the third Persian dynasty, the Arsacidæ of the classic writers, the Ashkanians of the Persians. This dynasty lasted till A. D. 226, under about 30 monarchs. (See Parthia.) In the beginning of the 3d century the victories of the Roman generals threw Parthia into such confusion that Artaxerxes, or Ardeshir as he is called by the native historians, claiming to be a descendant of the ancient royal family of Cyrus, revolted, and overthrew and put to death Artabanus IV., the last of the Arsacidæ, and proclaimed himself sovereign of the new Persian monarchy. He also restored the ancient religion of Zoroaster and the authority of the magi, which had fallen into discredit. The dynasty which he founded, under the name of the Sassanidæ (see Ardeshir), consisted of 28 or 29 monarchs, and continued upward of 400 years. Among the most famous of these kings were Sapor or Shahpur, the son of Ardeshir, who carried on a successful war with the Romans, in which he defeated and took prisoner the emperor Valerian; Sapor II., whose reign began with his birth in 309 or 310, lasted 71 years, and was marked by bloody wars with the Roman emperors Constantius and Julian, the latter of whom was defeated and slain in the contest (363); Varanes V. or Bahran Gour, who was celebrated for his munificence and generosity, and for his successful repulse of a Tartar invasion; and Chosroes or Khosru Nushirvan, who is considered by the Persians a model of justice, generosity, and sound policy, and who was both a great ruler and great conqueror, compelling the emperor Justinian to a disgraceful peace, and advancing the Persian arms to the Mediterranean on the west, beyond the Oxus and the Indus on the east, and into Arabia on the south. His reign of 48 years, from 531 to 579, was the golden age of modern Persia. His grandson, Khosru Parviz or Chosroes II. (590–628), who succeeded him after an interval of two short reigns, is also famous for his conquests, which extended through Syria and Palestine into Egypt, and even to Tripoli and Carthage, while at the same time and subsequently his victorious armies were for 12 years encamped near Constantinople. He is still more celebrated in the East for his luxury and magnificence, and oriental history abounds in tales of his palaces, his superb thrones, his immense treasures, his unrivalled poets and musicians, his 50,000 Arab horses, and his 3,000 beautiful women, the most lovely of whom was Shirin or Irene, a Greek and a Christian, whose beauty and whose love form the subject of a thousand poems. The latter years of his reign were unfortunate and inglorious. The emperor Heraclius, suddenly rousing from the sloth and self-indulgence which had hitherto marked his life, invaded Persia with a powerful army, and in six years Chosroes was stripped of all his foreign conquests, his famous palace at Dastagerd was plundered and burned, and finally he himself was dethroned and murdered by his eldest son Siroes or Shirueh in 628. From this time till the accession of Yezdegerd III. in 632, Persia was given up to anarchy. The Mohammedan Arabs were already attacking the empire, and Yezdegerd in vain attempted to stem the tide of armed fanatics that poured from the adjacent deserts. Two battles, one fought at Cadesia in 636, and the other on the plains of Nehavend in 641, where 100,000 men are reported to have fallen, decided the fate of Persia. The defeated monarch, flying from the field, took refuge in his eastern provinces, where for several years he wandered a fugitive till in 651 he was murdered by a miller, and with him ended the line of the Sassanian kings and the religion of the magi. After horrible massacres the people, persuaded by the sword, embraced Mohammedanism, only a small, obscure, and persecuted remnant daring to adhere to the ancient faith of Persia. (See GUEBRES.) For the next two centuries Persia was subject to the caliphs. But in 868 an adventurer named Soffar, who had been a pewterer and afterward a bandit, gathered a native force and expelled the viceroys of the caliph. He founded a dynasty known as the Soffarides, of which three more princes maintained a precarious authority, till in the beginning of the 10th century Persia was divided between the families of Samani and Dilami, the first of which reigned over eastern Persia and Afghanistan, and the second over the rest of the country. Under these dynasties Persia fell beneath the yoke of the Seljuks, and was ruled by Togrul Beg, Alp Arslan, and Malek Shah, all of whom were conquerors greatly celebrated in oriental history. Their dynasty declined and perished in the 12th century, and after a long period of anarchy Persia was overrun and conquered by the Mongols led by Hulaku Khan, the grandson of Genghis (1258), who established the seat of his empire at Maragha in Azerbijan. The next important event in the history of Persia was the conquest and devastation by Tamerlane toward the end of the 14th century. Under his successors civil war almost continually prevailed, until in the beginning of the 16th century Ismail, a descendant of a famous saint, Sheik Suffi, succeeded in making himself master of the kingdom and founded the Suffavean dynasty. He died in 1523, and was succeeded by his son Tamasp, whose reign of 53 years was eminently prosperous. Abbas, who ascended the throne about 1587, was a still greater sovereign, though to his own family he proved a sanguinary tyrant. After his death in 1628 the Suffavean dynasty gradually declined, and was at length overthrown by the Afghans, who conquered Persia in 1722, and ruled it for seven years with horrible tyranny, till they were expelled by the celebrated Nadir Shah, who in 1736 himself ascended the throne. His reign was memorable for success over foreign enemies and for bloody cruelty to his family and people. After his death in 1747 a series of revolutions occurred from conflicting claims to the throne, and order was not fully restored till toward the close of the century, when Aga Mohammed, first of the reigning dynasty of Kadjars, became shah. His successors have been Feth-Ali (1797–1834), Mohammed (1835–1848), and the present shah, Nasr-ed-Din, who ascended the throne in 1848, being then 18 years old. Persia has been involved in three wars since the accession of this dynasty. Of these, two were with Russia, the first of which terminated in 1813 and the second in 1828, both of them disastrously to Persia, which lost successively the provinces of Georgia, Mingrelia, Erivan, Nakhitchevan, and the greater part of Talish, the Russian frontier being advanced to Mt. Ararat and the left bank of the Aras; and the third was a war with England, which began in 1856, having originated in a series of disputes between officials of the Persian government and the British minister at Teheran. After repeated victories of the English troops in the south of Persia under the command of Generals Outram and Havelock, it was brought to an end on March 4, 1857, by a treaty signed at Paris, favorable to the demands of Great Britain. In 1860 a terrible pestilence and famine devastated parts of the country; and a still greater famine, due to the exceptionally light fall of snow and rain in 1870 and 1871, is believed to have caused the death of two millions of human beings. In the summer of 1873 the shah Nasr-ed-Din made a tour through Europe, visiting Vienna, Paris, and London, his diary of which has been published in English (London, 1874).—See Sir J. Malcolm's "History of Persia" (2 vols., London, 1815); Rawlinson's "Five Great Monarchies" (4 vols., 1862–'7); "History of Persia from the Beginning of the 19th century," by R. Grant Watson (1866); Spiegel's *Eranische Alterthumskunde* (2 vols., 1871–'3); "A General Sketch of the History of Persia," by Clements R. Markham (1874); "Glimpses of Life and Manners in Persia," by Lady Sheil (1856); "A Journal of Two Years' Travel in Persia," by Robert B. M. Binning (2 vols., 1857); "Journal of a Diplomate's Three Years' Residence in Persia," by Edward B. Eastwick (2 vols., 1864); and "A Journey through the Caucasus and Interior of Persia," by Augustus H. Mounsey, of the British legation at Teheran (1872).

PERSIA, Language and Literature of. The Persian, which for 900 years past has been the cultivated language of Persia, belongs to the Iranic group of the Indo-European languages. The earlier languages of Persia are treated in the article IRANIC RACES AND LANGUAGES. The present cultivated form of speech is called *Deri*, "court language," in distinction from the popular dialects. According to native authorities, each considerable province has a dialect of its own, and that which is spoken in and about Shiraz and Ispahan approximates most nearly to the cultivated tongue. Persian is still spoken, not only throughout the present kingdom of Persia, but all over the Iranian territory, and even beyond its borders; but its prevalence is different in different regions. About the Caspian it is in great measure crowded out by the dialects of the almost exclusively Turkish population. Throughout a great part of Khorasan the Persian is the language of the cities, while the nomadic tribes who occupy the surrounding wastes are of Tartar descent and idiom. In other parts this relation is in a manner reversed; thus, in Afghanistan and Beloochistan the ruling race is of another, though ultimately kindred lineage, while the mass of the agricultural population is made up of Persian-speaking Tajiks. Nearly the same is the case in the southern portions of Turkistan or Independent Tartary, an ancient seat of Iranian religion and civilization; and the Iranian population even extends beyond the Bolor Tagh into some of the provinces of eastern Tartary. Conquests, commerce, and culture have combined to carry the Persian language beyond its ancient limits; the subjugation of India by Persian monarchs introduced it as the court language of Delhi, and made Hindostan long a centre of Persian literary culture; it is but recently that Persian has ceased to be the recognized official language of British India. The Turks have carried it, in a certain way, as far in the opposite direction; the cultivated Osmanli is full of Persian words and phrases, and its literature is in great part founded upon Persian models.—The appearance of the modern Persian language, and the rise of its literature, are contemporaneous with the disintegration of the caliphate of Bagdad, and the resurrection of Persian nationality under native and virtually independent sovereigns in the 10th century. During the three centuries that Persia had lain under the heel of its Mohammedan conquerors, its national independence destroyed, its religion and social institutions swept away, it had exercised in virtue of its superior culture a powerful influence upon its oppressors, and its scholars had borne a prominent part in starting into life the Moslem literature, philosophy, and science; but not until after the lapse of that interval was there a revivification of elements distinctly Persian. With the latter part of the 10th century, then, begins the career of the modern Persian. This is hardly to be considered as the direct lineal descendant of either of the two ancient dialects, the Achæmenian or the Avestan, but it is more nearly related to the former than to the latter, as is shown by such evidences as the infinitive ending *ten*, Ach. *tanaiy*, Av. *teê*; *dest*, hand, Ach. *dasta*, Av. *zasta*, &c. It is closely connected with the Parsee, and may be considered a slightly modernized form of the Huzvaresh. As an analytical language, exhibiting an almost complete breaking down and abandonment of the ancient system of forms and inflections, and the substitution of independent form-words and connectives, it stands nearly upon a level with the English; its grammar, in striking contrast with the complexity of that of the two ancient dialects, is of the baldest simplicity. It is always written with the Arabic alphabet, to which, however, it has added four signs, to express the sounds *p*, *tch*, *zh*, and *g*; on the other hand, eight or nine of the Arabic characters are useless to it, occurring, save in very rare cases, only in Arabic words, and being pronounced, like other letters in the alphabet, without the distinctive Arabic utterance. The spoken alphabet is nearly as follows: vowels, *a*, *e*, *i*, *o*, *u* (as to the vowel pronunciation, even of the cultivated dialect, there appears to be much diversity in different regions; the vowels are written, of course, in the very imperfect Semitic fashion, sharing among them only three characters, and generally omitted when short); consonants—guttural, *k*, *kh*, *q*, *g*, *gh*; palatal, *tch*, *j*; dental, *t*, *d*, *n*; labial, *p*, *f*, *b*, *m*; semivowels, *y*, *r*, *l*, *v*; sibilants, *s*, *sh*, *s*, *zh*; aspiration, *h*. The Parsee alphabet is almost precisely the same with this, nor does that of the Huzvaresh present any difference worthy of notice. All show a near relationship with the systems of sounds of the ancient dialects, differing from them chiefly by the loss of certain aspirates (the dental), and by the possession of an *l*.—In treating of declension, we have first to note the fact that the Persian, like the English, has lost all suffixes and terminations distinguishing gender, and that it accordingly agrees with our language in possessing no artificial or grammatical gender. It is yet poorer than the English in lacking the distinction of gender in the pronoun; it cannot even say "he, she, it;" where a distinction has to be made between masculine and feminine, it employs separate words meaning male and female. The same is the case in the Parsee and Huzvaresh. There are two endings for the plural, *ân* and *hâ*, the former a relic of the ancient genitive plural (*asp-ân*, horses, Av. *açpanâm*, of horses), the latter of the dative and ablative (*asp-hâ*, Av. *açpaêibyaç*, to or from horses; a few Parsee words have the fuller form *hyâ*); *ân* is now regularly restricted to animate objects, but in the Parsee is applied to both animate and inanimate, and in the Huzvaresh is the only plural termination. The syllable *râ* is used as a sign of the accusative (*asp-râ*); it is originally an independent word, meaning "way," and in the two elder dialects is not an accusative termination, but adds to the noun the idea, "by way of, by reason of;" if an adjective follows the noun, the syllable is appended to it instead of to the noun (*asp-i-bad-râ*, the bad horse). Between a genitive and the noun which governs it is inserted the so-called *izâfet*, or the vowel *i*, as *asp-i-merd*, the horse of the man; the same is also interposed between the substantive and the adjective which agrees with it, as *asp-i-murdeh*, dead horse. The beginning of this usage is to be traced even in the Avestan; the inserted syllable is a relic of the relative pronoun *ya*, which has come to assume the office of indicating alone a relation originally expressed also by the termination of the following word. Thus, the former expression would have been in Avestan *açpo yo masyêhê*, the horse which (is that) of the man; the latter, *açpo yo mereto*, the horse which (is) dead. In the Parsee and Huzvaresh, this *i* also stands in other connections, as an ordinary relative pronoun. Some philologists, without sufficient reason, have chosen to see in the use of the *izâfet* an imitation of the construct state of the Semitic noun, and so a proof of Semitic influence. Singularity or individuality is indicated by an appended *é*, as *asp-é*, a single horse; this *é* is a remnant of the older *aêva*, one, and by the two next earlier idioms is used also as an independent numeral. The language possesses neither definite nor indefinite article. The suffixes of comparison of adjectives are *ter* for the comparative, *terîn* for the superlative; the latter is a peculiar Persian development; the two elder dialects have *tum*, corresponding to Av. *tema* (Sans. *tama*, Lat. *timus*). The Persian and Parsee pronouns are pure Iranian, modern representatives throughout of those presented by the ancient dialects; the Huzvaresh employs as often, or yet oftener, Semitic forms. The three later idioms have a complete set of suffix pronouns, which are, for the three persons, singular *em*, *et*, *esh*, plural *emân*, *etân*, *eshân;* in the Persian they are attached especially to nouns and verbs, to express the genitive, dative, or accusative relation, as *asp-em*, my horse, *guftem-esh*, I spoke to him; in the elder idioms they are appended only to conjunctions, prepositions, and other pronouns, as *ez-et*, from thee. They are a perfectly organic growth of the Iranian language, and are not to be attributed, any more than the *izâfet*, to Semitic influence.—The Persian verb has preserved hardly more of its original structure than the noun. It has indeed a complete and invariable set of personal endings, viz.: *em*, *î*, *ed*, *îm*, *îd*, *end;* but its tenses are mostly formed periphrastically. The infinitive ends in *ten* or *den* (Parsee usually, Huzvaresh always, *tan*), which corresponds to the Achæmenian *tanaiy;* the past participle in *teh* or *deh* (Ach., Av., and Sans. *ta*). From this participle is formed a preterite, by striking off the *eh*, and appending the forms of the present tense of the auxiliary "to be," which, except in the third person, *est*, agree precisely with the personal ending just given; thus, from *kerden*, to do, part. *kerdeh*, pret. *kerdem*. This becomes an imperfect by prefixing *mî* or *hemî*, which in Parsee and Huzvaresh is an independent word, meaning always, continually. From the unabbreviated participle, with the present and preterite of the same auxiliary, come a perfect and pluperfect, *kerdeh em* and *kerdeh rûdem*. A future is formed by prefixing to the apocopated infinitive the present of the verb to will, to wish, *qâhem kerd*. The imperative of this verb is *kun;* the irregular verbs, which are numerous, and as usual the oldest and the most used of all, present always a discordance between the forms of the root as they appear in the infinitive and imperative respectively, and in this consists their irregularity; these two forms being given, the rest of the verb follows as a matter of course. Sometimes the one, sometimes the other, shows the root in a purer and more original form; in *kun* we have it as affected by the conjugational peculiarity of the ancient present and imperfect; compare Ach. *a-kun-ush* (imp.), Av. *keren-aôimi*, Sans. *krn-omi*. By adding to the imperative the personal endings, we obtain the only original and simple tense of the Persian verb, corresponding to the ancient present and imperfect, and having the value of both present and aorist; it is made distinctively the former by prefixing *mî* or *hemî*, already spoken of. Of the ancient subjunctive we have a single trace, in an optative third person singular; *kunâd*, may he do! The passive is formed by the auxiliary *shûden*, meaning originally to go.—The facility of composition in the Persian is very great; epithets formed of a noun and a verbal, of an adjective and a noun, and of two nouns, are of the most frequent occurrence. A very characteristic feature of Persian style, too, is the formation of a compound or derivative verb by combining an adjective or noun with some one of a large class of half auxiliaries, of which the most frequent are to do, to make, to bring, to have, to show, to come, to become, to take, and to find. It is partly by the favoring influence of such processes of composition that the Persian has become in later times so impregnated with Arabic. The earliest Persian writers, as Firdusi and the translator of Tabari's Arabic history, wrote in a nearly pure Iranian dialect, with no greater infusion of Arabic words than was natural and unavoidable, considering the position and influence in Iran of the Arab religion and culture. But a less legitimate mixture soon began to prevail; every highly cultivated Persian was as familiar with Arabic as with his own mother tongue, and a depraved and servile taste introduced the practice of drawing upon the Arabic lexicon not only to fill out felt deficiencies of the Persian vocabulary, but, from affectation and pedantry, to such an extent as to half convert the language into Arabic. Often the merest necessary cement of a sentence or paragraph is Persian, all the materials of which it is composed being Arabic; and occasionally such a monstrosity is met with as a sentence or phrase which is pure Arabic, even to its construction. Hence, no one can now make himself a thorough Persian scholar, or gain a familiarity with the Persian literature, who has not first mastered the Arabic. In the present low condition of Persian nationality, any reaction against this abuse is hardly to be looked for; it is the rankest injustice on the part of the Persian toward his mother tongue, which is one of the most copious and flexible, the most sonorous and musical, the most cultivable, highly cultivated, and elegant of modern languages. The theory of a specially intimate connection between the Persian and the Teutonic (German) languages is entirely destitute of real foundation.—LITERATURE. The scanty literatures of the earlier Persian dialects, the Avestan, the Huzvaresh, and the Parsee, being comprised within the limits of a single work, or connected body of writings, which together make up the sacred scriptures of the modern Parsees, will be best considered together in the article ZEND-AVESTA. We shall accordingly speak here only of the modern Persian literature. A national feeling, and an active literary spirit, must have been for some time stirring among the masses of the Persian population, to lead to so immediate and hearty a recognition of the claims of song on the part of all the upstart dynasties of eastern Iran, which succeeded one another so rapidly during the 9th and 10th centuries. Each court had its bards, whose productions, and the admiration which they excited, shed lustre upon the throne. Royal patronage has borne an important part in the whole history of Persian literature; one of its chief branches is panegyric, and few of its great names were not attached to the personal suite, or recipients of the special bounty, of some monarch. Even the wild Tartar tribes which burst one after another into Iran, and subjugated it to their sway, were at once softened and charmed by the strains of Persian song, and their barbarian dynasties became, without exception, its lovers and protectors. Had not the feeling been genuine, the genius strong, the national appreciation universal and hearty, such patronage must soon have corrupted the rising literature, converting it into mere servile adulation. Of servility and adulation there was indeed enough; but along with it a true, healthy, growing, and productive literary life, during more than five centuries. We can give here, of course, but an outline sketch of its development, and can mention only the most prominent and highly considered of the hundreds of authors of note, whose works or whose reputation have come down to later times. Although names and fragments of poetry of an earlier date have escaped oblivion, it is under Mahmoud of Ghuzni, the first Moslem conqueror of India, and on the extreme eastern verge of Iran, that the national literature was fairly launched on its new career. Under this prince, and at his bidding, Firdusi (died in 1020) sang his immortal epic, the *Shah Nameh*. This earliest of the Persian poets remains unexcelled in genius and dignity by any of his successors. His work summed up the whole mass of native traditions respecting the national history; it is a true national epic, a final relation, accepted by a whole people, of its own popular legends. No other Persian poem enjoys the wide repute of this; none other has the same high interest to us of the West. Of epic-romantic poets, the most famous is Nizami, who flourished a century and a half after Firdusi. His "Quinquiad," or collection of his five best romances, became the model of many a like collection in later times. From among the innumerable crowd of those who have distinguished themselves especially by their panegyrical writings, we need mention but two: Enveri or Anvari, the acknowledged prince of panegyrists, who lived in Balkh about 1150, and Khakani, who lived about a generation later. Both are remarkable for learning, as well as for fertility of fancy and elegance of style. An important branch of Persian literature, and one which began to develop itself very early, is that which represents the doctrines of the Sufis, or religious mystics. Doubtless we are to recognize a certain resistance on the part of the Persians to the slavery into which they were forced to Arab faith and doctrine, in their general adoption, on the one hand, of the unorthodox and detested tenets of the Shiahs, who accept the Koran and Mohammed, but deny the right of the first three caliphs; and, on the other hand, in the prevalence of mysticism among them. Persia, if not the home of Sufiism, as has been both maintained and denied, is at least the ground where it has most fully developed itself, and held longest and most exclusive sway. The oldest Sufi poet of great celebrity is Zenayi, who died in 1180; his works were superseded by the yet more highly esteemed productions of Ferid ed-Din Attar, who, born about 1120, lived more than 100 years, and was slain at last in the Mongol storm and sack of the city where he dwelt. His works are unintelligible in their interior meaning without special commentaries. Among them, the most esteemed are the "Book of Counsel" (*Pend Nameh*), "Language of the Birds" (*Mantik et-tair*), and "Essences of Substance" (*Jewahir Nameh*); the two former have been published and translated in Europe. But even Attar was excelled by his younger contemporary Jelal ed-Din Rumi (died about 1262), the founder of the most widely extended order of Moslem monks, the Mevlevi, and author of the *Mesnevi*, the chief oracle of Sufiism, and, next to the *Shah Nameh*, the most generally known and highly esteemed (in the Orient) of all the productions of oriental literature; its profundity, its sublimity, and its inspired wisdom are regarded as unapproached and unapproachable.

A poet more to our mind, and who has done more than any other for the fame of Persian poetry in the West, is Saadi. He belongs to the same period with the authors last named, having died in 1291, at the age of upward of 100 years. He is said to have spent the second 30 years of his life in travelling, and the third in meditating upon and digesting his acquisitions and experiences, and only the last part of it in the actual composition of his immortal works. If skeptical as to the literal truth of this systematic division of his life, we need not question that he travelled and saw much, and wrote his most esteemed productions at an advanced age. We know that he lay for some time in Christian captivity, taken prisoner in battle with the crusaders. In both these circumstances has been sought an explanation of the cooler fancy, the purer taste, the more practical morality, which distinguished Saadi among oriental authors. He is most eminent as a moral and didactic poet; his two best works, the "Fruit Garden" (*Bostan*) and "Flower Garden" (*Gulistan*), are collections of brief tales and apologues, interspersed with aphorisms and lessons of morality, in prose and verse; both have been translated into nearly all the languages of Europe. By his countrymen Saadi is equally esteemed as a lyric poet. But the greatest of Persian lyrists is Hafiz, of Shiraz, who lived a century later (he died about 1390); in him Persian poetry is regarded as having attained its very highest flight. Though a dervish, deriving his name (Hafiz, retainer) from his knowing by heart the whole Koran, and though living always in contempt of wealth and splendor, he was a thorough free-thinker and indifferentist in matters of religion, and his inspiration is solely that of the most enthusiastic and intoxicated sensual enjoyment; the unvarying themes of his song are love and wine, the rose and the nightingale. A mystical explanation has been given to the outbursts of his passion, and the same poems which are sung as erotic and drinking odes by the young debauchee, are pored over by the aged devotee as containing the essence of holy ecstasy; but the interpretation is forced and false, and mainly a device to save the pride of Persian literature from condemnation as an infidel and sensualist. Persian poetry has but one other great name to boast after Hafiz; it is that of Jami, who died in 1492, at an advanced age. He is a poet of the most varied genius, and, though not accounted as the very first in any department, he is excelled only by the very first in each; thus, in panegyric he is esteemed as second only to Enveri, in romance to Nizami, in mystic poetry to Jelal ed-Din, in moral and didactic to Saadi, in lyric to Hafiz; these five, with Firdusi and himself, being admired as the seven most brilliant stars in the firmament of Persian poetry. Jami is perhaps most highly esteemed as a romantic poet, though prose works of high merit also came from his pen, including a history of the Sufis, and a collection of letters as models of epistolary style, a branch of elegant literature much cultivated by the Persians in later times, and in which Jami is unexcelled. With the 15th century closes the proper history of Persian poetry; since that time, although much increased in extent, it has grown little in value.—We have hitherto spoken only of the poetry of Persia, because that is by far the most important and valuable department of the national literature. Next to it in consequence is the department of history. For the older traditional history of Persia itself, Firdusi has continued the chief and almost sole authority; later writers have added little to what is recorded in the *Shah Nameh*. The *Mujmil ettevarikh*, a historical work by an unknown author, a portion of which has been translated by Mohl in the *Journal asiatique* (1841), is also important. The Persian extract from a large historical treatise written by the celebrated Moslem Abu Jafar Mohammed ben Jerir ben Yezid, called Tabari, made by Belami in 968, which has recently been translated into French (*Chronique de Tabari, traduite sur la version persane par H. Zotenberg*, Paris, 1867–'9), is specially valuable. The supplementary works written by the successors of Firdusi are not yet fully known, and several of them, the *Gershasp Nameh*, *Sam Nameh*, *Barzu Nameh*, *Jehangir Nameh*, *Banu Sushasp Nameh*, and *Bahman Nameh*, have been only partly examined. A host of later historians, beginning from rather a recent period, about the middle of the 13th century, have treated of the later Persian history, especially of that of Genghis Khan and his descendants and successors, and of the remarkable overturnings of Asiatic power of which Iran has been a principal scene; and their works are important sources of knowledge respecting the events of the period. Among the chief names here are Reshid ed-Din (born 1247), Wassaf (of the same epoch), whose elaborate and excessively ornate style makes him one of the most difficult of Persian authors, and Sherif ed-Din, the historian of Tamerlane. Of later authors, Mirkhond (died in 1498), a writer of universal history, and his son Khondemir, are most distinguished. An important branch of Persian history, too, has India for its native place and its theme. In entertaining or amusing literature, such as fables, tales, anecdotes, legendary and supernatural stories, and the like, Persia is very rich, and it is supposed to be the source whence much of the European literature of this class, dating from the middle ages, was derived. The *Anvari soheili*, which constitute a Persian paraphrase of the fables of Bidpay, Tuvaini's *Nagaristan* or "Picture Gallery" (1360), the *Bakhtiyar Nameh*, and the *Tuti Nameh*, deserve special mention. In the 18th century Ferid Ghafer Khan paraphrased the legends of Hatim ben Ubaid ben Said, which, with those of the bandit and minstrel Kurroglu, form one of the richest collections of oriental fairy stories.

Kheyâm, a modern poet, who is also a famous mathematician, is said to bear comparison to Goethe and Heine for extent of knowledge, keenness of wit, and the materialism of his philosophical views. Some of his poems have been translated by Nicolas (Paris, 1867). In recent times have appeared translations of celebrated European works. Noteworthy among these are a version of some of the writings of Descartes (1863), Mirza Habib's translations of Molière and La Fontaine (1870), which are remarkable for the fidelity and facility with which the niceties of the French language are reproduced, and several medical treatises. Similar works are published every year in Tabriz, Teheran, Bombay, Delhi, and Lucknow. In Moslem theology and jurisprudence, as was to be expected, the Persians are chiefly dependent upon Arabic authorities. In philosophy and the exact sciences nearly the same is the case, yet a large portion of the most highly esteemed scientific works in the Arabic literature are by Persian authors.—The best earlier Persian grammar in English is Sir William Jones's, and there are later ones by Lumsden, Lee, Forbes, and others, as well as one by a native Persian, Mirza Mohammed Ibrahim; this last has been translated into German, with considerable improvements, by Fleischer (2d ed., 1875). Vullers of Giessen has written in Latin a Persian grammar of some pretension, which has reached a second edition; he has also put forth a dictionary, explained in Latin (2 vols. 8vo, 1855–'64, with a supplement, Bonn, 1867), and founded mainly on the native lexicons, of which there are many, the most noted being the *Farhang-i-Sh'ûri* (Constantinople, 1742), the *Burhân-i-Qâtih* (Calcutta, 1818), and the *Haft Kulsum*, "Seven Seas" (Lucknow, 1822). The best Persian-English dictionary is that of Francis Johnson (3d ed., London, 1852). A convenient dictionary in one volume is Berge's *Dictionnaire persan-français* (Paris, 1868).

PERSIAN GULF, an arm of the Indian ocean, between Persia and Arabia, extending mainly from lat. 24° to 30° N., and from lon. 48° to 56° 30′ E.; extreme length 550 m., breadth from 40 to 250 m.; area estimated at about 80,000 sq. m. Its entrance from the Indian ocean is through the Arabian sea, the gulf of Oman, and the strait of Ormuz, the last of which is about 35 m. wide. The shores are much indented; but the only harbor of importance is Bushire, besides Bassorah on the Shat-el-Arab. The coasts are low, except near the entrance, where the mountains on both sides rise to a considerable height and come close to the sea. On the S. W. or Arabian side there are numerous shoals and reefs. There are several islands in the neighborhood of the Arabian shore and the strait of Ormuz, the most important of which are Kishm, Ormuz, and the Bahrein or Aval islands. The only considerable river that falls into the gulf is the Shat-el-Arab, or the united stream of the Euphrates and Tigris. At the straits of Ormuz the tide rises 12 ft., and about the N. end of the gulf 6 ft. There are valuable pearl fisheries in the neighborhood of the W. and S. shores.—The shores of the Persian gulf are inhabited almost exclusively by Arabs. For many years the gulf was infested by pirates, who found safety among the shoals and islands on the coast of Arabia. In 1809, and again in 1819, the British sent expeditions against them from Bombay, which, in conjunction with the imam of Muscat's forces, completely destroyed their vessels. The Persian gulf is the ancient sea of Babylon, and the earliest record (besides the Scriptural accounts) which we have of its navigation is that of the voyage of Nearchus in 325 B. C.

PERSIANI, Fanny, an Italian vocalist, born in Rome, Oct. 14, 1818, died in May, 1867. She was a daughter of the singer Tacchinardi and the wife of the composer Persiani. She first appeared at Leghorn, achieved a brilliant success in Rome in *Lucia di Lammermoor*, and was the principal soprano singer at the Italian opera in Paris from 1838 to 1850. The compass and flexibility of her voice were great, and besides *Lucia* she chiefly excelled in the *Matrimonio segreto* and *Linda di Chamouni*.

PERSIAN POWDER, a substance consisting of the dried and pulverized flowers of the *pyrethrum carneum* and *P. roseum*, which is reputed to be very efficacious in destroying insects, and is extensively used in Persia, Turkey, and Russia. The plant is a native of the Caucasus, and bears a composite flower, which is gathered wild and sent chiefly to Tiflis for manufacture. It was introduced into France about 1850. Since then M. Willemot has procured the seed from the Caucasus and has raised the plant in England; and as the species thus raised differs from any previously known, it has been named *pyrethrum Willemoti*. Although destructive to insects, it is said to be harmless to man. It is stated by Prof. Landerer in a scientific periodical (April, 1874) that the common oxeye daisy, *chrysanthemum leucanthemum*, has long been employed in Dalmatia for preparing a powder like the Persian, and that both this and *C. segetum* are now largely used in Germany as a substitute, and found particularly effective against parasites in sheep and cattle.

PERSIGNY, Jean Gilbert Victor Fialin, duke de, a French politician, born in the department of Loire, Jan. 11, 1808, died in Nice, Jan. 13, 1872. His family being in reduced circumstances, he enlisted in the army as a private when 17 years old, was afterward admitted to the military school of Saumur, and rejoined the army as a non-commissioned officer of hussars. After the revolution of 1830, his loyalty being suspected, he was dismissed on a charge of insubordination. Going to Paris in search of employment, he joined the editorial staff of the *Temps*. He is said to have been strongly attracted at this time by the doctrines of the Saint-Simonians, and to have proposed sharing the retreat of Père Enfantin at Ménilmontant; but the statement has been authoritatively denied, as has also the assertion that he went to the Vendée at the time of the duchess de Berry's presence there in 1832. About 1833 he ceased to use his patronymic, Fialin, and assumed the title of viscount de Persigny, which was hereditary in his family, but had been suffered to lie dormant for several generations. In 1834 he abandoned all hope of a Bourbon restoration, and established a journal, *L'Occident français*, for the propagation of Bonapartist principles. A close intimacy sprung up between him and Louis Napoleon, and Persigny at once set to work to organize the Bonapartist party. One result of his exertions was the attempt upon Strasburg in 1836. More fortunate than his companions, he escaped and went to England, where he published *Relation de l'entreprise du prince Napoléon-Louis* (London, 1837). In July, 1840, he participated in the landing at Boulogne, for which he was sentenced to 20 years' imprisonment. From Doullens, where he was first incarcerated, he was allowed to remove on account of ill health to Versailles, where he enjoyed comparative liberty. Here he wrote an essay entitled *L'Utilité des pyramides d'Égypte* (1844), which he presented to the academy of sciences, and in which he asserts that those gigantic constructions were merely built to protect the valley of the Nile against the encroachments of the sand of the desert. On the revolution of 1848 he returned to active life, and was chosen as Louis Napoleon's aide-de-camp, and appointed to a high rank in the staff of the national guard. In 1849 he was elected to the legislative assembly, and proved an uncompromising supporter of the presidential policy. During his occupancy of this position he was sent on a temporary mission to Berlin. On the *coup d'état* of Dec. 2, 1851, in the preparation of which he was concerned, he appeared at the head of the 42d regiment of the line and took possession of the hall of the assembly. He was appointed a member of the consultative committee. On May 27, 1852, he married Eglé Napoléone Albine, granddaughter of Marshal Ney, and at the same time received the title of count and a gratuity of 500,000 francs. In January, 1852, he was appointed minister of the interior in place of M. de Morny, who had refused to sign the decree confiscating the Orleans property; he continued to hold this office till April, 1854, when he resigned on account of ill health. The following year he was appointed ambassador to England; he resigned in April, 1858, was reappointed in May, 1859, and was recalled to France in November, 1860, to resume the place of minister of the interior and to reorganize that department, which he did in accordance with the liberal ideas then affected by the emperor. In 1863, however, the parliamentary elections resulting in the overwhelming defeat of the ministry, he resigned on June 23. On Sept. 13 he was made a duke. In his place in the senate, and through the public press, he continued to be a persistent worker in the Bonapartist interest; and his occasional letters on public affairs were often supposed to be directly inspired by Napoleon. He defended the policy of the emperor in the matter of the Franco-German war, and was faithful to him until the revolution of Sept. 4, 1870, when he retired from political life.

PERSIMMON. See DATE PLUM.

PERSIS, the name given by the ancient Greeks and Romans to Persia proper, corresponding nearly to the modern Persian province of Fars or Farsistan. According to the earliest accounts, the territory included also the region of Carmania, the modern Kerman, but later geographers distinguish between the two. It was bounded N. by Media Magna, E. by Carmania, S. W. by the Persian gulf, and N. W. by the river Oroatis and Susiana or Elam. The earliest known capital of this region was Pasargadæ, the second Persepolis, besides which there were but few cities of note, such as Gogana, on the gulf, and Gabæ, in the interior. The rivers, all insignificant, included the Araxes, Granis, and Sitacus. (See FARS, and PERSIA.)

PERSIUS FLACCUS, Aulus, a Roman satirical poet, born in Volaterræ, Etruria, in A. D. 34, died in 62. He belonged to the equestrian order, and went to Rome and studied with Lucan under the stoic philosopher Annæus Cornutus. He was distinguished for his blameless morals and amiable character. His extant works consist of six satires, which comprise in all no more than 650 hexameters, and there is no proof that he ever wrote more. His style is obscure, and abounds in colloquialisms, far-fetched metaphors, and abrupt transitions. The best editions are those of Jahn (Leipsic, 1868) and of B. L. Gildersleeve (New York, 1875). English translations have been made by Holyday, Dryden, Brewster, Sir William Drummond, and Gifford (the last published, together with a literal prose version by the Rev. L. Evans, in Bohn's "Classical Library"), and Conington (posthumous, 1872).

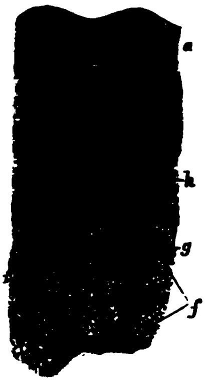
PERSON, a N. county of North Carolina, bordering on Virginia, and drained by branches of the Dan and the head waters of the Neuse river; area, about 400 sq. m.; pop. in 1870, 11,170, of whom 5,104 were colored. It has a diversified surface and a generally fertile soil. The productions in 1870 were 53,824 bushels of wheat, 138,085 of Indian corn, 78,181 of oats, 9,150 of Irish and 10,023 of sweet potatoes, 69,155 lbs. of butter, and 1,227,150 of tobacco. There were 1,383 horses, 2,292 milch cows, 2,146 other cattle, 4,889 sheep, and 8,935 swine. Capital Roxborough.

PERSONAL EQUATION, a term used to designate the amount of correction which it is necessary to make in the recorded results of scientific observations, in order to compensate for errors arising from personal characteristics of the observer. The term is commonly used in reference to astronomical observations, but it is equally applicable to all scientific observations where it is necessary to estimate very small portions of space or time. Where an event is of such a nature that it can itself be made to record the exact time when it took place, and simultaneously the time of its happening is observed and recorded by a person, it has been found that, no matter how practised and skilful the observer may be, he will always differ a little from the absolute truth. One observer will place it a little too early, another a little too late. It has also been found that these errors are habitual. An observer whose tendency is to place the time of an event too late will, on observing a great number of repetitions of the same event, always place them too late. The habitual difference between the time noted by the observer and the true time is called the observer's absolute personal equation. Again, it has been found by experience that two observers equally skilful, using equally good instruments and observing a great number of repetitions of the same event (for example, the transit of a star over the meridian), will constantly differ from each other by a small amount. If A habitually finds the time two tenths of a second too late, this two tenths of a second is A's absolute personal equation. If B habitually fixes the time three tenths of a second too late, then that amount is his absolute personal equation. The difference between these two absolute equations is called their relative personal equation. Ordinarily the absolute personal equation cannot be ascertained; but as the difference between two observers can be ascertained without deciding how much either of them differs from the exact truth, the relative personal equation can always be found. The relative personal equation of the same two observers may vary according to the nature of the facts which they observe. Thus the transit of a star over the meridian, or at least the process by which it is ascertained, occupies a considerable time, while the occultation of a star is instantaneous. Two observers in observing transits may have a relative personal equation of a certain amount, while in observing occultations it may be constantly of a different amount.—The causes of the phenomena of personal equation have given rise to much discussion. The most probable explanation seems to be as follows: The formation of every judgment requires time, and men of different organizations form judgments with different degrees of rapidity. Hence one person in observing transits, for example, judges that a star is opposite one of the micrometric wires of his telescope almost at the instant that the fact occurs; another requires a small fraction more of time to make up his mind. This small fraction of time is their relative personal equation.—The first recorded case of personal equation occurs in the "Observations" for the year 1796 of Maskelyne, the astronomer royal of England. He says that in August, 1795, his assistant Mr. Kinnebrook began to record his observations half a second later than he should, and in 1796 about eight tenths of a second too late, and that it appeared to be impossible for him to overcome the habit. Maskelyne assumed that his own observations were correct, and discharged his assistant, although he says he was "diligent and useful." This was a case of personal equation, and at the present day astronomers place as much reliance upon the observations of Kinnebrook as upon those of Maskelyne. The subject has since been fully treated by Bessel in the "Kōnigsberg Observations" for 1822, and by Wolf in the *Mémoires de l'Observatoire de Paris*, vol. viii.

PERSONS, or **Parsons, Robert**, an English theologian, born at Nether Stowey, Somersetshire, June 24, 1546, died in Rome, April 18, 1610. He was educated at St. Mary's Hall, Oxford, and Balliol college, of which he was successively fellow (1568), tutor, bursar, and dean. Having become a Roman Catholic, he went to Padua in 1574, and studied medicine and civil law. He entered the society of Jesus in 1575, was sent to study in the Roman college, and there received holy orders. In 1580 he accompanied Edmund Campian to England, and travelled about in various disguises ministering to his coreligionists. Campian having been imprisoned in 1581, Persons soon afterward fled to the continent, opened a preparatory seminary for English youths at Eu in Normandy, became successively rector of the English college at Rome and provincial of the English missions, sent emissaries to the king of Scotland at Holyrood to enlist his sympathies in favor of his captive mother, and visited for the same purpose the courts of France, Rome, Portugal, and Spain. He chiefly resided in the Peninsula till 1594, and used his influence to found seminaries for English students at Valladolid (1589), San Lucar (1591), Seville and Lisbon (1592), and St. Omer (1593). In 1594 he was reappointed rector of the English college at Rome, and retained that post till his death. He has been accused by some writers of employing his credit at the courts of Roman Catholic sovereigns to foment conspiracies against Queen Elizabeth, an accusation supported by the tenor of his writings. His most important works are: "A brief Discours contayning certaine Reasons why Catholiques refuse to goe to Church," printed in London, though dated at Douai (1580; also entitled "A Treatise on Schism"); *De Persecutione Anglicana Libellus* (Paris and Rome, 1582; English translation, Douai, 1582); "A Christian Directorie guiding men to Eternal Salvation" (part i., London, 1583; part ii., 1591; 2d ed. in modern English, 8vo, 1700, several times reprinted); "A Booke of Christian Exercise appertaining to Resolution" (1584; "altered to the Protestant use," 1585, 1586, 1589, 1594, and 1609); *Responsio ad Elisabethæ Reginæ Edictum contra Catholicos*, claiming for the pope power to dethrone sovereigns and absolve subjects from their allegiance (Lyons, 1592); "A Conference about the next Succession to the Crown of Ingland" (Nassau, 1594); and "Treatise of the Three Conversions of England from Paganisme to Christian Religion" (3 vols. 8vo, 1603–'4, published under the assumed name of Nicolas Doleman). Several of his works have passed through many editions, and the principal ones are now (1875) in course of republication in England.

PERSPECTIVE. See DRAWING.

PERSPIRATION (Lat. *per*, through, and *spirare*, to breathe), the watery secretion exhaled by the perspiratory glands of the skin. These glands consist of one or more cylindrical tubes, lined with glandular epithelium and arranged in the form of a convoluted globular coil, situated in the subcutaneous connective tissue immediately beneath the cutis. From each gland an excretory duct passes directly upward in a nearly straight course through the cutis, and afterward in a strongly spiral course through the cuticle, terminating by a very minute and oblique opening upon the surface. The tubular folds of the perspiratory gland are surrounded by a close network of capillary blood vessels, from which the watery and saline ingredients of the perspiration are exuded into the cavity of the tube, while others are perhaps formed by the secreting action of the glandular epithelium. The fluid thus produced accumulates in the glandular tube, fills its excretory duct, and is finally discharged upon the surface of the skin. The importance and quantity of this fluid may be estimated from the numbers and extent of the glands engaged in its production. On the posterior portion of the trunk, thighs, and legs there are about 500 perspiratory glands to the square inch of skin; on the anterior portion of the trunk, the forehead, neck, forearm, and back of the hand and foot, about 1,000 to the square inch; and on the sole of the foot and the palm of the hand, 2,700 in the same space. According to Krause, the number of perspiratory glands over the whole body is not less than 2,800,000; and as each tubular coil, when unravelled, is about $\frac{1}{13}$ of an inch long, the entire extent of glandular tubing is not less than 153,000 inches, or about two miles and a half.—The perspiration consists mainly of water, holding in solution various saline substances, such as chlorides, sulphates, and carbonates, a volatile acid body, the precise nature of which is not fully determined, and odoriferous animal matters which give a peculiar smell to the perspiration. Under ordinary circumstances the perspiration is produced and discharged in such moderate quantity that it becomes volatilized and escapes by evaporation as rapidly as it is poured out. It does not appear therefore as a visible moisture upon the skin, and is known accordingly as the "insensible transpiration." But when the circulation through the cutaneous vessels is excited by exercise, warmth, or other causes, the activity of the secretion is increased, the fluid is poured out in greater abundance than it can be disposed of by evaporation, and it therefore appears in standing drops of perspiration, or in an abundant layer of moisture diffused over the surface. The principal office of the perspiration is to regulate the temperature of the body, and particularly of the integument, by preventing its rising above the natural standard. Although the temperature of the blood and the internal organs is, as a general rule, 100° F., that of the skin is less than this, usually about 98°. The integument is constantly losing heat by its exposure to an external atmosphere which is generally much cooler than itself, and its temperature is thus kept down to the proper level notwithstanding it is constantly supplied with warm blood. But when the external temperature rises to 80°, 90°, or 100°, or even higher, the perspiration being poured out in greater abundance, evaporation goes on more actively, and the abnormal heat is thus expended in the vaporization of the watery fluid, the integument remaining at or near its own natural temperature. A high external temperature therefore becomes uncomfortable only when the skin remains dry, or when the atmosphere is already overloaded with moisture, so that evaporation is interfered with. But when the perspiration is freely discharged and readily evaporated, a man can bear without discomfort an external temperature much higher than 100°. The amount of perspiration discharged during violent exercise has been known to rise as high as 5,000 or 6,000 grains an hour; and under the combined influence of muscular exertion and a high external temperature, it has been found considerably greater than this. Under ordinary circumstances, the average amount of perspiration discharged by man in the course of 24 hours is nearly two pounds avoirdupois.

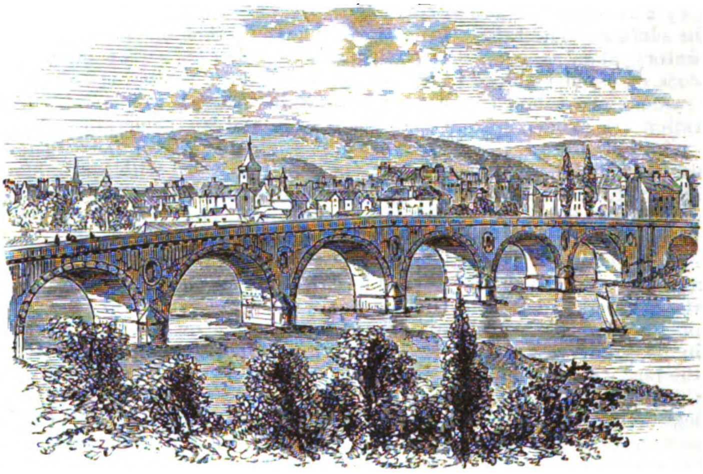


Perspiratory Glands of the Skin, seen in vertical section.

a. Cuticle. *d*. Subcutaneous cellular tissue. *f*. Lobules of fat in subcutaneous cellular tissue. *g*. Perspiratory gland. *h*. Excretory duct of perspiratory gland.

PERTH, a S. W. county of Ontario, Canada, drained by the Thames and Maitland rivers; area, 842¼ sq. m.; pop. in 1871, 38,083, of whom 16,575 were of Irish, 11,183 of English, 10,042 of Scotch, and 7,716 of German origin or descent. It is traversed by the Grand Trunk railway and its Buffalo and Goderich branch. Capital, Stratford.

PERTH, a city of Scotland, capital of Perthshire, on the Tay, 33 m. N. by W. of Edinburgh; pop. in 1871, 25,585. The Tay is crossed by a fine bridge of nine arches, 880 ft. in length, connecting the town with the suburb Bridgend. Further down, the Perth and Dundee railway crosses on a handsome stone and iron bridge opened in 1864. The town was once surrounded by walls, of which no traces now remain. It is laid out with considerable regularity, with spacious streets crossing at right angles and lined with handsome freestone houses. There are several terraces and crescents and two fine public parks. Among the prominent public edifices are the ancient church of St. John, the county buildings, and the penitentiary, which is the general prison for Scotland. The town has a theatre, public library, and museum of the antiquarian and natural history society. The principal manufacture is colored cotton goods, and there are several ship yards. The Tay is navigable to this port for vessels of 300 tons, and about 400 enter and clear annually. The salmon fishery is important, Perth sending 250 tons annually to London alone.—Perth is supposed to be of Roman origin, was made a burgh in 1106 and fortified in 1210, was the capital of Scotland till 1437, and has been the scene of some remarkable events in the history of that country. It was captured by Edward I. in 1298, by Montrose in 1644, and by Cromwell in 1651. It was occupied by Dundee in 1689, and by the highlanders in 1715 and 1745.



Perth, Scotland.

PERTH, a city of Australia, capital of the colony of West Australia, picturesquely situated on the Swan river, 12 m. above Freemantle at its mouth, and 1,700 m. W. N. W. of Melbourne; pop. in 1871, 5,007, including the military and convicts at the depot. It is the seat of an Anglican and a Roman Catholic bishop. The principal buildings are the city hall, an imposing structure entirely built by convict labor, a mechanics' institute, the governor's palace, and the pensioners' barracks. It had two newspapers in 1873. Perth was constituted a city in 1856.

PERTH AMBOY, a city and port of entry of Middlesex co., New Jersey, at the head of Raritan bay and at the mouth of Raritan river. 36 m. N. E. of Trenton and 21 m. S. W. of New York; pop. in 1870, 2,861; in 1875, about 3,500. It is opposite the S. end of Staten island, with which it is connected by a ferry. A railroad bridge and ferry connect it with South Amboy on the right bank of the Raritan, whence there is communication with Philadelphia by the Camden and Amboy railroad. It has communication with New York by the Pennsylvania, New Jersey Central, New York and Long Branch, and Staten Island railroads. The Easton and Perth Amboy railroad, nearly completed, runs to the coal regions of Pennsylvania, and is intended to make Perth Amboy a large coal depot. The harbor is good and easily accessible to large vessels. The city contains six churches, a large public hall, a state bank, a young ladies' boarding institute, a cork factory, and a stoneware pottery. Fire brick is manufactured here, and has the reputation of being the best in the United States. Kaolin and other fire clays are exported in considerable quantities. The shipping of the port, April 1, 1875, amounted to 36,800 tons.—Perth Amboy, or rather the point on which the city stands, was called by the Indians Ambo. It was settled about 1680 by a colony from Scotland, who named it Perth in honor of the earl of Perth, one of the proprietors; but the Indian name was so much used that finally the place took both names. It received a city charter in 1718, and for a time was the commercial rival of New York. It was at one period the capital of East Jersey. William Franklin, the last royal governor of New Jersey, was seized here by the patriots in 1776.

PERTHES. I. Friedrich Christoph, a German publisher, born in Rudolstadt, April 21, 1772, died in Gotha, March 18, 1843. He was early employed in book stores in Leipsic and Hamburg, where in 1796 he established himself on his own account, and Johann Heinrich Besser became his partner in 1798. The house attained great importance in Germany, but suffered during the French occupation of Hamburg, his patriotism involving him in great difficulties. In 1822 he founded a house in Gotha, leaving to his partner the business in Hamburg, which is still continued under the name of Perthes-Besser. He rendered great service to the trade, especially as one of the founders of the book exchange in Leipsic.—See *Friedrich Perthes' Leben*, by one of his sons (3 vols., Gotha, 1848–'51; 6th ed., 1872; English translation, 2 vols., Edinburgh, 1856). II. **Johann Georg Justus**, popularly known as JUSTUS, uncle of the preceding, founded in 1785 a publishing house at Gotha, and died in 1816. This was continued by his son WILHELM (1793–1853), who was the first of the family to issue (1816) the *Almanach de Gotha* in French and German (*Gothaisches genealogisches Taschenbuch*), previously published by Ettinger. Wilhelm bequeathed the business, under the name of its founder Justus Perthes, to his son BERNHARD WILHELM (1821–'57), who in 1854 founded a geographical institute, which has acquired great importance within the last 20 years under the direction of August Petermann, by promoting explorations and publishing the *Mittheilungen*, a monthly periodical. The firm of Justus Perthes is now conducted (1875) for account of the widow of Bernhard Wilhelm Perthes, Rudolf Besser being a partner. It employs more than 200 persons, and has become especially celebrated for issuing excellent maps and narratives of explorations.

PERTHSHIRE, a central county of Scotland, bordering on the counties of Inverness, Aberdeen, Forfar, Fife, Kinross, Clackmannan, Stirling, and Argyle; area (including two small detached portions, one on the frith of Forth, and one surrounded by Stirlingshire), 2,835 sq. m.; pop. in 1871, 127,762. The Grampians form its N. and W. boundary, and rise in the summit of Ben Lawers to the height of 3,984 ft. The county is drained by the Tay and its tribuaries and by the Forth. The Tay flows from the N. E. end of Loch Tay, a lake 16 m. long, and runs circuitously about 100 m. to the firth of Tay, from which it is navigable for vessels of 100 tons as far as Perth. Lochs Earn, Rannoch, and Katrine, with several other beautiful but smaller lakes, are in this county, which is also famous for the wild beauty of the *straths* or mountain passes and glens. In the low alluvial region of the southeast is one of the finest agricultural districts in Scotland; and in the highland districts are extensive sheepwalks. Linen and cotton are manufactured; and the fisheries on the Tay are the most valuable in Scotland. The county was formerly divided into the districts of Gowrie, Perth, Stormont, Strathearn, Menteith, Breadalbane, Balquhidder, and Rannoch. The principal towns are Perth, the capital, Crieff, and Dunblane.

PERTY, Joseph Anton Maximilian, a German naturalist, born at Ohrnbau, Bavaria, Sept. 17, 1804. He studied at Munich, and in 1833 became professor of zoölogy and of natural history in the university of Bern, of which he was several times rector. His principal works are: *Allgemeine Naturgeschichte als philosophische und Humanitätswissenschaft* (4 vols., Bern, 1838–'45); *Die mystischen Erscheinungen der menschlichen Natur* (Leipsic, 1861); *Ueber das Seelenleben der Thiere* (1865); *Blicke in das verborgene Leben des Menschengeistes* (1869); *Ueber den Parasitismus in der organischen Natur* (Berlin, 1870); and *Die Anthropologie als die Wissenschaft von dem körperlichen und geistigen Wesen des Menschen* (2 vols., Leipsic, 1873–'4).

PERU, a city and the capital of Miami co., Indiana, on the Wabash river and canal, and on the Toledo, Wabash, and Western, and the Indianapolis, Peru, and Chicago railroads, 67 m. N. of Indianapolis; pop. in 1850, 1,266; in 1860, 2,506; in 1870, 3,617; in 1875, 6,250. It is surrounded by an exceedingly fertile country, with which it has an important trade. It contains a manufactory of Howe sewing machines, two plough factories, woollen mills, a brass foundery, a manufactory of furniture, a spoke and wheel factory, a flax factory, an extensive manufactory of splint baskets and wooden ware, and the shops of the Indianapolis, Peru, and Chicago railroad. There are two national banks, with a joint capital of $350,000, a fine court house, two magnificent public school buildings, with good graded schools, a large Catholic school house, a Lutheran school building, a daily and two weekly newspapers, and seven churches.

PERU, a city of La Salle co., Illinois, at the head of navigation on the Illinois river, here crossed by a fine bridge, 68 m. above Peoria, and 105 N. by E. of Springfield; pop. in 1860, 3,182; in 1870, 3,650; in 1875, estimated by local authorities at 5,000. It is healthfully and handsomely situated, surrounded by fine scenery, has a very active business, and has become an important manufacturing town. Coal abounds in the vicinity, and is extensively mined. Horse cars run to La Salle, 1 m. distant, the terminus of the Illinois and Michigan canal; and the Chicago, Rock Island, and Pacific railroad passes through the city. Regular lines of steamers in summer run to Peoria and St. Louis. About 125,000 tons of ice are put up here annually for southern markets. There are four large grain warehouses. The chief manufactories are a plough factory, employing 125 men; zinc works, employing 75 men; a foundery and machine shop, employing 35 men; a planing mill, two large breweries, and two extensive flouring mills. The city is lighted with gas and has a good fire department. It contains five public school buildings, a good hotel, a national bank, a weekly newspaper, and seven churches.

PERU (Span. *Perú*), an independent republic of South America, extending from lat. 3° 20′ to 22° 20′ S., and from about lon. 67° to 81° 26′ W. It is bounded N. by Ecuador, from which it is separated mainly by the Rio Marañon or Upper Amazon; E. by Brazil and Bolivia, the dividing lines with which are respectively the Javary from its confluence with the Amazon, the 10th parallel, the Purús to lat. 12°, and thence a line bisecting Lake Titicaca and joining the western cordillera of the Andes, which completes the boundary southward; S. by Bolivia, from which it is separated by the Rio Loa; and W. by the Pacific. The boundary with Brazil is now generally regarded as marked by the Rio Javary, but the jurisdiction of the Peruvian colonial government extended eastward to the banks of the Teffé. The area is now roundly computed at 500,000 sq. m. The territorial division comprises 17 departments (subdivided into provinces, and these into districts) and two littoral provinces, which, with their estimated populations and their capitals, were officially stated in 1873 as follows:

DEPARTMENTS.		Population.	Capitals.
Piura		153,000	Piura.
Amazonas		69,000	Chachapoyas.
Loreto		65,000	Moyobamba.
Libertad		219,000	Trujillo.
Cajamarca		198,000	Cajamarca.
Ancachs		295,000	Huaraz.
Lima		400,000	Lima.
Huánuco		195,000	Huánuco.
Junin		188,000	Cerro de Pasco.
Ica		180,000	Ica.
Huancavelica		142,000	Huancavelica.
Ayacucho		280,000	Ayacucho.
Apurimac		165,000	Abancay.
Cuzco		300,000	Cuzco.
Puno		278,000	Puno.
Arequipa		200,000	Arequipa.
Moquegua		90,000	Tacna.
Callao	littoral provinces	85,000	Callao.
Tarapacá		70,000	Tarapacá.
Total		3,417,000	....

Another official document, published in 1871, gave the population at 3,199,000; but the most carefully prepared statistical works represent it as not exceeding 2,500,000, made up approximately as follows: Indians, 57 per cent.; hybrids (cholos, zambos, &c.), 23 per cent.; whites born in the republic, 12½ per cent.; negroes, 3½ per cent.; Chinese, 1¾ per cent.; and other foreigners, 2¼ per cent. The capital is Lima, with a population in 1868 of 121,362. Other towns of note are Callao, Cuzco (the ancient capital of the empire of the incas), Arequipa, Ica, Moquegua, Tacna, Iquique, Ayacucho or Huamanga, Cerro de Pasco, Huánuco, Huaraz, Cajamarca, Trujillo, Chiclayo, Lambayeque, Moyobamba, and Piura.—The coast, forming an irregular N. and N. W. line, is notched with numerous inlets, but there are no deep indentations save the large bay of Sechura, fronting the desert of the same name between the 5th and 6th parallels, and the bay of Pisco and Independence bay, between lat. 13° and 15°. The two last are formed by two rocky promontories jutting obliquely N. W. and S. E. into the sea, called Punta Huacas and Carretas head; these, with Points Aguja, Payta, Parina, and Blanco, all in Piura, Salinas in Lima, and Coles in Moquegua, are the most remarkable headlands on the Peruvian seaboard. The principal ports are Payta, at the head of a beautiful bay in the department of Piura, with the best anchorage on the coast, and considered the oldest port in Peru; Eten and Salaverry, in Libertad; Callao, the port of Lima, the bay of which is formed and shielded by the barren island of San Lorenzo; Pisco, in the department of Ica; Islay, in Arequipa, and formerly the port for Arequipa city, but lately superseded in this respect by Mollendo, a few miles S., which is much frequented by ships since the opening of the railway to Arequipa; Arica, in Moquegua, through which is carried on most of the foreign trade of Bolivia by the Pacific; and Pisagua and Iquique, in the province of Tarapacá. The remainder of the 34 ports are unimportant, and with them all Peru has not a single harbor, but open roadsteads, in many of which, as at Mollendo, the water is at times so rough as to prevent communication between ships and shore for several days. Indeed, along the whole coast, the swell rolling in from the Pacific breaks in a heavy surf, which renders landing in most places dangerous, and often impossible even for boats. In exposed positions rafts called *balsas* are used for landing or embarking goods or passengers. In some of the more important ports, however, as at Callao, landing has of late been considerably facilitated by the construction of iron moles. Since the introduction of steam navigation almost all the towns on the banks of the Marañon, Huallaga, and Ucayali are stations for the river steamers; and Puno is among the principal ports of the great Alpine lake Titicaca. The shore, especially in the north, is in general bold with deep water close to land; as much as 70 to 80 fathoms are reported in some parts within a short distance of the cliffs. Islands are far less numerous and usually smaller on the Peruvian than on any other coast washed by the south Pacific. The most important are the Chinchas (see CHINCHA ISLANDS), at the entrance to the bay of Pisco; the Guanape, Macabí, and Lobos groups, between lat. 6° and 9°; and the Pájaros islets off the southern shores of Tarapacá; all of which are remarkable for their extensive guano deposits. The island of San Lorenzo is the largest, and attains here and there an elevation of 1,000 ft.—The country is traversed by the Andes in two separate ranges, the Cordillera Oriental or Andes proper, and the Cordillera Occidental or coast ridge; to which is added a third and still more easterly chain, N. of the parallel of Pasco, about 11°. The coast ridge enters the republic from the south, and, running almost parallel to the shore, at a distance of from 45 to 65 m., unites with the Cordillera Oriental in the *nudo* or mountain knot of Vilcanota, between lat. 14° and 15°, the northern limit of the great inter-alpine plain containing Lake Titicaca, a comparatively small portion of which belongs to Peru. This knot, near the eastern extremity of which stands the imperial city of Cuzco, comprehends the mountains of Vilcanota (15,525 ft. above the sea), Carabaya, Abancay, Huando, and Andahuaylas. Almost the minutest inflections of the coast correspond to like inflections in the Cordillera Occidental. The table land of Cuzco, comprising an area of about 15,000 sq. m., on the flattened crest of the Andes, has a mean elevation in the south of 11,500 ft. above the sea, or about 1,000 ft. more than in the north, and is divided by low transverse ridges into numerous valleys. At the N. extremity the cordilleras again bifurcate, and run parallel till they unite anew in the knot of Pasco in lat. 11° S., bounding the fertile valley watered by the Rio Jauja, and about half the length of the Titicaca basin. This division of the western cordillera, here designated as the Sierra de Huarochirí, comprises two summits rising above the line of perpetual snow and visible from Lima, whose inhabitants call them el Toldo de Nieve; and still further N. are the colossal peaks of La Viuda and Sasaguanca. The knot of Pasco is famous for the silver mines of Lauricocha or Santa Rosa, and the table land which it forms has an estimated elevation of 11,420 ft. according to Humboldt. A little N. of the parallel of Pasco the Andes separate into three chains. The most easterly, a small lateral branch, trending first N. E. for two degrees, and then curving abruptly N. W., divides the valleys of the Ucayali on the east and the Huallaga on the west, but gradually lowers, until in lat. 6° 40′ it is crossed by the latter stream, and finally disappears before reaching the southern bank of the Amazon. The second or Andes proper is the dividing line between the basins of the Huallaga and Marañon; and the third or Cordillera Occidental runs between the Marañon and the coast, comprising between lat. 9° and 7° 30′ the Nevados de Pelagatos, de Moyapata, and de Huaylillas, the last mountain rising above the line of perpetual snow for several degrees N. This depression is general in all the ranges in the same interval, while S. of the Nevado de Huaylillas each sensible lowering in one chain is compensated by a corresponding elevation in the other. The coast chain and the Cordillera Oriental do not again unite before the nudo de Loja beyond the Ecuadorian frontier, the mean height of which does not exceed 6,500 ft.; and in the parallel of Jaen, 5° 45′, neither of them rises higher than 2,000 ft. The valley here enclosed by them embraces some of the hottest portions of the Andine region. Of the two great cordilleras, the western is much the broader, wilder, and more rugged, and its peaks are generally less pyramidal, though loftier, than those of the other, which are for the most part needle-shaped; its general elevation is also more uniform. It is the dividing line between the streams flowing to the Pacific and those to the Atlantic, the latter finding their way by tortuous courses through the Cordillera Oriental. Some of its passes are among the highest on the globe; that from Lima to Tarma and Pasco crosses the ridge at an elevation of 15,760 ft. The snow line is lower in Peru (about 16,000 ft.) than in Bolivia (17,000). The culminating point of Peru, the volcano of Misti in Arequipa, is only 20,300 ft. above the sea, or lower than all the volcanic peaks of Bolivia. The principal volcanic hearth of Peru is the department of Arequipa, the other peaks besides Misti being Pichu, Charcani (18,000 ft.), and the Pan de Azúcar (17,000 ft.), all towering over the city of Arequipa, and Omate, Tutupaca, and Ubinas. The most destructive eruptions hitherto chronicled have been those of Misti, one of which in the 16th century buried the city in ashes, and necessitated its removal to its present site, 7 m. further W. from the crater. The local names given to special portions of the ranges are those of the departments which they traverse, while the volcanoes and other isolated peaks are designated by special names. The region hitherto described is known in the republic as the *sierra* or mountain country, a name applied to all parts of the territory over 7,000 ft. above the sea, except the very highest plateaux, which are usually called *páramos*. The tract called *la costa* or the coast, between the steep ascent of the Cordillera Occidental and the Pacific, varies in width from 20 to 50 m., and slopes toward the ocean with a very irregular surface and rapid descent, furrowed by deep depressions or gullies, which run from the mountains to the sea. These gullies are generally traversed by rivers, many of which are dry during a great part of the year. The ridges between the rivers are complete deserts, varying in breadth from 10 to 90 m. The surface is very uneven, and is covered with hillocks of considerable size, composed of fine, light yellow drift sand, which is often driven about with great velocity by the wind, and ascends in columns to a considerable height. All traces of a path between the river valleys are thus obliterated, and no stranger can travel from one to another without a guide, who generally directs his course by the stars at night, and by the wind during the day, which almost always blows from the south.—Darwin and others suppose that since its occupation by man the coast has been elevated at least 85 ft., and that the upheaval has not been continuous, but interrupted by periods of subsidence. The country E. of the Cordillera Oriental, and of the small lateral range forming the eastern boundary of the Huallaga basin, slopes gently down into vast plains called the *montaña*, forming part of the great alluvial valley of the Amazon, and like it covered with dense primeval forests. The portion comprised between the Huallaga and the Ucayali is known as the Pampas del Sacramento, or the land of the missions, thus named from the establishments there founded by the Jesuit missionaries after the Spanish conquest. The hills in this region are low beyond the Ucayali.—The rivers which drain the Peruvian territory are divided between two great basins, that of the Pacific and that of the Amazon. The streams descending from the W. declivity of the Cordillera Occidental are for the most part short and precipitous, and entirely dry for several months of the year, so that they can only be utilized for irrigation. The largest of these streams, which number about 60, are the Chira and the Piura, in the department of Piura; the Santa in Ancachs; the Rimac, which passes Lima and falls into the sea at Callao; the Camana and Tambo in Arequipa; and the Loa, forming the southern boundary of the republic. The great rivers of the eastern slope of the Andes unite to swell the flood of the Amazon, into which they all (except the Purús) discharge before leaving the republic. The most westerly, the Marañon, said to rise in Lake Lauricocha near the mines of Cerro de Pasco, N. of Lima, holds a generally N. N. W. course thence to lat. 5° 30′, collecting the waters of comparatively few and unimportant streams in the narrow valley which it drains. At that point it bends abruptly E. N. E., and maintains that direction to Tabatinga, lon. 69° 50′ where it enters Brazil. (See AMAZON.) The Huallaga, whose head waters descend from the same mountains as those of the Marañon, runs parallel with the latter to lat. 7° 30′, and thence N. N. E., and falls into that river almost at right angles, in lon. 75° 30′. Next is the Ucayali, formed by the united waters of the Apurimac and Urubamba, themselves mighty rivers with large and navigable tributaries, and joining the Marañon at Nauta, about 200 m. N. E. of the junction of the Huallaga. The main stream of the Apurimac, which some geographers long regarded as the head branch of the Amazon, takes its rise in the S. W. corner of the table land of Cuzco, which it drains by numerous affluents, as it does also the valley of Jauja by a river of that name, a tributary of the Mantaro, which last joins the Apurimac in lat. 12°. The Urubamba, a considerable stream, but much obstructed by cataracts, rising chiefly in the Sierra de Vilcanota, unites about lat. 8° 30′ with the Apurimac, to form the Ucayali. The Javary and the Purús, the upper portions of which have been but recently explored, are less important than the Ucayali, but the Purús is navigable for about 2,000 m. from its embouchure.—The geological character of Peru, except in particular localities, has not been well examined. Red sandstone is met with both on the coast and in the interior, often accompanied by vast deposits of salt. Granite and porphyry appear on the coast and in the highlands; and the commonest rocks on the sierras are trachyte, augite, porphyry, and diorite. All the large mountains N. of lat. 8° are of trachyte. Between Lake Titicaca and Cuzco, the more elevated ground bordering the valleys is formed chiefly of clay slate; and in the neighborhood of Arequipa, and thence to Lake Titicaca, the soil is volcanic. The mineral productions, more particularly the precious metals, have been famous ever since the discovery of the country. Gold is found in many places, and nearly all the mountain streams wash it down in small particles. The mountains are interspersed with veins of gold and silver ores, and with copper and lead. In many places gold is found in quartz. The most celebrated gold mines are those of Carabaya. The silver ore is particularly rich, frequently yielding from 5 to 50 per cent. This ore constitutes the chief mineral wealth of the country, and presents itself in all forms and combinations, from the pure metal to the lead ore mixed with silver. It is found at the highest elevations yet reached. Mining in Peru has until within a few years been in a backward condition; but with the introduction of improved machinery and lines of railway, this industry, in common with all others, has undergone a favorable change. The value of the silver produced between 1630 and 1803 has been calculated at $1,232,000,000, of which, according to the records at Madrid, $849,445,500 were from the three mines of Cerro de Pasco, Hualgayoc, and Huantajaya. In eight years (1826–'33) the silver coined at Lima alone amounted to $20,000,000. Humboldt estimated the average annual yield of the gold and silver mines in Peru at $5,300,000. The yield of the mines of Cerro de Pasco, Puno, Huantajaya, Hualgayoc, &c., in 1873, amounted to $6,000,000 in silver bullion. Silver mines are now worked also near Iquique and Huarochiri. The chief quicksilver mines are those of Huancavelica and of Chota. Lead, iron, aluminum, sulphur, lime, magnesia, and sulphate of soda occur in extensive quantities in the departments of Ayacucho, Huancavelica, Arequipa, Tarapacá, Ancachs, Piura, and Cajamarca; cobalt and nickel are found in the province of Huanta; borax and gypsum are very abundant in many places. The marble and alabaster quarries of Puno and Ayacucho are extensive, several species of the first being highly prized; and writing slate and lithographic stones are plenty. Petroleum occurs in several localities in Piura. In 1825 good coal was discovered at Cerro de Pasco, and still later coal beds were found 18 m. S. of Túmbez, and in 1873 at Paracas, 8 m. S. of Pisco. Not far from Arica brown coal occurs on the coast; and an extensive coal tract was discovered in 1873 at Sumbay on the railway from Arequipa to Puno, for the working of which a company was organized at Lima with a capital of about $1,800,000. The working of the numerous coal mines has given a fresh impulse to the industrial and commercial activity of the country. The principal source of Peruvian wealth since 1836 has been the guano islands, which however are mere specks when compared with the vast uninhabited and unexplored southern coast line, where innumerable flocks of birds have resorted for ages, and where rain never falls. (See GUANO.) With the new beds discovered in the second half of 1874, it was computed that the total quantity of the substance in all the known localities of the republic was about 26,000,000 tons, some 8,000,000 of which, however, were inaccessible. The remaining 18,000,000, at $37 50, the average current price for the better qualities in Europe, would represent $675,000,000. Other great sources of wealth are the saltpetre and borax of the pampa of Tamarugal in Tarapacá, though the former is too deliquescent to be used in the manufacture of gunpowder. It is calculated that the saltpetre grounds embrace an area of 50 square leagues. In 1860, 77,000 tons were exported from Iquique. Borax is also shipped, in spite of the government prohibition. In 1873 the saltpetre was constituted a government monopoly; but in 1874 it was contemplated to abandon the monopoly, and apply an export duty. In the latter year 320,000 tons were shipped. The appearance of the Tarapacá desert resembles that of a country after snow, before the last dirty patches are thawed, from being covered by a thick crust of common salt and of a stratified saliferous alluvium, seemingly deposited as the land slowly rose above the sea level. The salt, which is white, very hard, and compact, occurs in water-worn nodules projecting from the agglutinated sand, and is associated with much gypsum. The saltpetre beds follow for a distance of nearly 150 m. the margin of a great basin or plain 3,300 ft. above the sea, which from its outline Darwin pronounces to have once been a lake or more probably an inland arm of the sea, as he infers from the presence of iodic salts in the saline stratum. A variety of precious stones are found in Peru, which is likewise remarkable for the number of its thermal and mineral springs, many of which are medicinal.—The climate, on the whole regarded as tolerably healthy, differs essentially in the four great topographical divisions: the coast region, the sierras, the table lands, and the eastern plains. The coast is usually called the rainless region; indeed, with the exception of Iquique, where a light shower falls once in very many years, rain is unknown from the river Loa to Cape Blanco, a phenomenon attributed to heated air currents ascending from the vast sand wastes, which in some places are from 45 to 60 m. in width. During the winter, from May to November, there are dense drizzling mists. The hills about Lima, a little more than 1,000 ft. above the sea, are carpeted with moss enamelled with beautiful yellow lilies (*amancáes*), a vegetation indicative of a much greater degree of moisture than at a corresponding altitude in Tarapacá. Northward of Lima the climate grows gradually damper; and in the extreme northwest, beginning from the parallel of Cape Blanco, rains are as copious and the forests as dense as in the littoral region of Ecuador. Toward December, when the dry season has fairly set in, the weather, except for an interval at noon, is for the most part cool and delightful. The cold current which runs along this coast from the seas adjoining Cape Horn, and the temperature of which is on an average 8° lower than the mean annual temperature of the atmosphere at Callao, tempers the heat on the shores of Peru. The mean heat at Callao does not exceed 60°, and the mercury is frequently as low as 55°. At Lima, 6 m. inland from Callao, and 600 ft. higher, it never falls below 60° in winter, and seldom rises in summer above 80°. The hottest day ever known in Lima was in February, 1791, when the thermometer marked 96°. In Piura, the extreme N. W. province of Peru, the temperature ranges in summer from 80° to 96°, and in winter from 70° to 81°. The situation of the coast region, between the influences of the sea on the one side and the lofty mountains on the other, renders the climate temperate. The rainy season in the sierras, the table lands, and the eastern plains corresponds to the period of drought on the coast. The watery vapors are then wafted from the latter by the sea breeze to the high regions, where they are condensed and fall in heavy showers; whence the phenomenon of the coast rivers drying up in winter and pouring down copious floods in summer. During the greater part of the year the winds on the coast blow from the south, varying from S. S. E. to S. W.; in the winter months breezes from the north sometimes occur. At some distance from the shore the S. E. trade wind prevails, with greatest strength in winter. Lightning is sometimes seen on the coast of Peru, but thunder is never heard, and storms are quite unknown. In the sierras or highlands and the table lands there is a considerable range of temperature, between the rain line, at about 7,000 ft. above the sea, and the snow line. About 9,000 ft. above the sea the average temperature is 60°, varying little throughout the year, and the seasons are only distinguished as the wet and the dry, the former of which lasts from November to May. The climate of the eastern plains is hot and moist. The moist winds which blow from the Atlantic, over the plains watered by the Amazon and its tributaries, are stopped in their progress toward the Pacific by the Andes, and accumulate clouds which descend in heavy rains accompanied by thunder storms of great violence. These copious rains cause such an excess of moisture that the region is very unhealthy, and few individuals among the Indian tribes scattered along the banks of the rivers reach the age of 50 years. Ague is unknown in the interior; but on the coast both foreigners and natives, at all seasons, suffer severely. A remarkable phenomenon occurs periodically along the coast from Callao N. as far as Lambayeque, a distance of about 500 m., consisting of a fetid, nauseous, and depressing odor, accompanied by changing colors of the water, and a curious discoloration of the white paint both outside and inside of the shipping. The painter, as the phenomenon is called, has by some been attributed to miasmatic effluvia percolating through the land from the Andes, and by others to the decomposition of the excreta washed into the bays at the embouchures of the rivers; whatever the cause may be, the repulsive element most sensibly perceived is sulphuretted hydrogen. The only noticeable physiological effect upon the inhabitants is an aggravated form of cephalalgia. The cold in the higher mountain regions is excessive; hail and thunder storms are frequent and terrific; and such affections as the *veta* or *mareo*, producing weariness, blood-spitting, and vertigo, and the *surumpé*, an acute inflammation of the eyes, sometimes attended with delirium, and caused by the reflection of the solar rays on the snow, render these districts unfavorable for prolonged abode.—The flora of Peru is particularly rich and productive. The soil is everywhere as much as 2 ft. deep, and in many parts 3 ft. Extensive arable tracts, pasture lands, and forests alternate in all directions, except in the most elevated districts, and in a few patches of the shore region. The arboreal vegetation in the north and east is most luxuriant, including a great variety of timber and cabinet woods; and the cinchona groves of the north are equal to those of the famous Loja district in Ecuador. Among the other remarkable trees are the caoutchouc, the *quillay*, serviceable for cleansing woollens, the vegetable silk tree, the copal, yielding a resin efficacious in pulmonary affections, the breadfruit tree, the mulberry, and many others; clove, copaiba, cinnamon, sarsaparilla, ipecacuanha, jalap, indigo, and other useful trees and plants abound. A very important tree is the *erythroxylon coca*, the leaves of which are extensively used by the Indians as a nutritive stimulant. Especial mention is made of the *escabedier* and of the *cedron*, the latter being considered an efficacious antidote for the most deadly poisons. The tree ferns range between 1,500 and 5,000 ft. above the sea; beyond the height of 10,500 ft. arborescent vegetation disappears; between 6,500 and 13,500 ft. alpine plants are found; and species of the *Wintera* and *Escallonia* occur between 9,200 and 10,800 ft., and form scrubby bushes in the cold and moist climate. The fruits comprise oranges, peaches, apricots, apples, pears, quinces, pomegranates, plums, cherries, bananas or plantains, cocoanuts, dates, mangos, sapotes, medlars, with pineapples, aguacates, chirimoyas, granadillas, and many others of exquisite flavor unknown in the temperate zones. Peru produces all the cereals and vegetables common to western Europe. Maize in many districts of the *montaña* or eastern plains yields four good crops annually. The *chenopodium quinoa* is commonly cultivated on the table lands as a substitute for the potato, *solanum tuberosum*, which is likewise abundant in the northern highlands. This region is supposed by some to have furnished, instead of the plains of Bogotá, the first potatoes introduced into Europe. The sweet potato grows plentifully in all the valleys. Cotton, the sugar cane, the vine, the olive, coffee, and tobacco (in Jaen and Santa) are cultivated for export, but the yield of the last two is as yet inconsiderable; and vanilla and a species of the *nopalea cochinilifera* receive attention. Cotton plantations are fast multiplying in the littoral departments from Piura southward to Moquegua, the mean annual production now being about 300,000 bales, and the qualities of the different varieties are ranked as equal to those of middling Orleans, sea island, &c. Sugar plantations are also on the increase in almost all the departments E. and W. of the cordilleras; and the cacao of Cuzco, where the plant is almost exclusively produced, is said to be superior even to that of Carácas. The vine thrives best in Ica and Moquegua, where it bears after the second year. Wines and brandies of excellent quality are produced, especially the wines named "Elias," "Latorre," and "Cabello." As the mulberry is particularly prosperous here, the rearing of the silkworm has of late years become an important industry. Agriculture on the highlands and the eastern plains is still carried on in the rudest manner, and with almost the same kind of implements found in the country by the Spanish conquerors; but on the coast modern appliances are gradually gaining ground. The fertile valley of Cañete is occupied with sugar plantations, mostly furnished with perfect labor-saving machinery; and one of them, embracing 10,000 acres, yields rum and sugar of a mean annual value of $2,000,000. All the ploughing is there performed by steam. The tendency at present is to supplant cotton culture with sugar.—The puma, jaguar, and wild cat infest the forests; bears roam in the mountainous districts. The principal game are two varieties of deer, peccaries, tapirs, and rabbits. Among the rodents are the vizcacha and myriads of mice; and there are foxes, skunks, armadillos, the large and small anteater, porcupines, sloths, and in the northwest all the varieties of monkey common to the great Amazonian forests. The llama is indigenous, and, like its congeners the vicuña, poco vicuña, alpaca, and guanaco (all of which, however, are smaller and slenderer), thrives best in the highlands. Cattle, horses, mules, and asses are extremely numerous, particularly in the littoral provinces; and countless flocks of sheep are everywhere to be met with in the fertile Andine valleys. The rivers and lakes of the montaña abound in delicious fish, including the salmon, several varieties of which are unknown north of the equator; the manatee or river cow is likewise common in the Apurimac and Ucayali, together with a large cetacean somewhat resembling the sword fish; and huge alligators haunt the banks in such numbers as to render them unapproachable without the utmost caution. Turtles are so abundant that several tribes of Indians carry on a profitable traffic in oil extracted from their eggs. Land lizards are comparatively few, but serpents are extremely common, and embrace several varieties, some of which are among the most venomous, as the rattle and corral snakes, and the hideous *trigonocepha-*

lus. The condor is here represented in four species; the turkey buzzard is the most efficient scavenger in every town and village; and the varieties of hawks are numerous. European barn-yard fowls of every species, as well as partridges, snipe, pigeons, turtle doves, pheasants, and other edible wild birds, are plentiful; and there are numerous varieties of parrots, toucans, humming birds, &c. The shores of Peru are frequented by myriads of sea birds (*lula variegata*), which in the time of the incas were protected by law during incubation, and to which and to numberless seals haunting the coasts and adjacent islands is due the famous manure called guano.—The population is made up of whites, mostly descendants of the early Spanish settlers, various tribes of Indians, negroes, and Chinese, and an endless variety of hybrids from the intermingling of all of them, including cholos, zambos, mulattoes, and mestizoes. Pure-blooded Africans have gradually diminished in number since the importation of negro slaves ceased in 1793, and the few now remaining are to be found only in the vicinity of the coasts. Slavery was finally abolished in Peru in 1855. The most important of the aboriginal races are the Quichuas or Incas and the Aymaras, both of whom shortly after the conquest by the Spaniards embraced Christianity. (See AYMARAS, and QUICHUAS.) The river banks in the eastern plains are inhabited by independent tribes, some of whom, through the unremitting energy of the missionaries established in the Pampas del Sacramento between the Huallaga and the Ucayali, have become Christians. These cultivate maize, rice, and coca, with a few esculent leguminous plants, cotton from which the women weave coarse cloths, and annotto, used by some of them to paint their faces. Some other tribes still wander in their primitive state of savagism, and a very few practise cannibalism. The Spanish branch of the population is frank, mild, loyal, generous, and very hospitable; the men are brave, intelligent, and patriotic. Education has always been common among the better classes, and is now rapidly extending to all grades of society. The Indians are mild and pacific, but indolent and apathetic, and somewhat given to melancholy. The cholos and mestizoes, here as in Bolivia, Colombia, and Mexico, are whimsical and turbulent, and the chief fomenters of the political strifes hitherto so prevalent in the republic. Owing to the insufficiency of hands for the public and other works in the republic, particularly felt after the abolition of slavery, the introduction of Chinese was resorted to, and was extensively carried on for a time, until prohibited by law in 1856. But the next year that law was repealed, and the cooly traffic was briskly resumed, the laborers being brought from the Portuguese colony of Macao, under a treaty with the Portuguese government dated March 26, 1853. In the 11 years 1860-'70 the number of coolies embarked at Macao was 48,301, of whom only 38,648 arrived at Callao; and by 1873 more than 80,500 laborers had landed in Peru. To prevent the continuance of abuses, a Peruvian envoy was despatched to Peking in 1872, and a treaty of friendship, commerce, and navigation was signed June 26, 1874. By a special agreement a Chinese commission was to be sent to Peru to inquire into the condition of the Chinese laborers resident in the republic, the Peruvian government to redress all grievances, and the immigration in future to be under the immediate supervision of Chinese commissioners. (See COOLY.) In 1874 an appropriation of $100,000 annually was initiated for the promotion of immigration from Europe. In the first six months after the passage of the law 1,000 Italians settled in the republic. Under the new law immigrants can have their passage paid by the government, and acquire national lands on very favorable terms.—The industries hitherto most successfully carried on in Peru are the pastoral, agricultural, and mining; but manufactures are still in a backward state. Nitrate of soda is manufactured on the coast in Tarapacá; sugar, rum, and wines are extensively made; coarse cotton and woollen stuffs, as also straw hats, mats, coarse earthenware, and other articles for domestic use, are made by the Indians; in the vicinity of Callao and Lima there are brick and lime kilns, glass works, and a paper factory, the paper being made from the yuca plant; and dyeing, tanning, soap making, and the preparation of glue are carried on. In Lima there are steam saw mills and flour mills, cotton factories, breweries, and extensive gas works. At Monsefu there is a copper foundery, where are manufactured nearly all the sugar pans used on the Peruvian plantations.—The two great staples of export are guano and nitrate of soda; both are almost exclusively sent to Great Britain. Other exports are Peruvian bark, sugar, cotton, and wines, especially those of Pisco, which somewhat resemble Madeira wines. The cotton shipped in 1870 was 106,000 bales. Sugar is likewise becoming a prominent article of export to Liverpool. Except for the port of Callao, it is impossible to obtain accurate information relating to the value of the foreign trade of Peru, which is estimated at $55,000,000 annually, of which $25,000,000 is for imports. Great Britain supplies the woollen, linen, and cotton fabrics, railway material, and coal; France the silks, fancy goods, and wines; while machinery of all kinds, agricultural implements, American manufactures in general, provisions, lumber, and petroleum are furnished by the United States, the last named commodity being sent from California and Oregon. The total value of the exports to Great Britain for a series of years has been as follows: 1868, $17,000,130; 1869, $19,962,360; 1870, $24,405,375; 1871, $19,859,840; 1872, $21,058,615; 1873, $26,597,860. The total value of the imports from the same country in the same period was as follows: 1868,

$5,661,865; 1869, $6,908,475; 1870, $8,805,865; 1871, $10,798,850; 1872, $14,351,195; 1873, $12,623,110. From the following synopsis for the port of Callao may be formed an idea of the trade with the United States. In the year ending Sept. 30, 1872, there entered 118 American vessels, with an aggregate tonnage of 124,085, and cargoes of lumber, wheat, coal, sperm oil, railway ties, &c., of a total value of $3,641,695; and the number of vessels cleared for the United States was 114, aggregate tonnage 115,604, mostly laden with guano, the total value of the cargoes being $4,039,352. The total shipments of petroleum from the United States in the year 1871–'2 comprised 181,629 gallons; in 1872–'3, 233,490; and in 1873–'4, 272,555. The value of the produce and bullion shipped from the port of Arica in 1866 was $3,898,733; 1867, $3,510,760 50; 1868, $3,758,172; 1869, $3,358,443 25; 1870, $3,936,531 12; 1871, $4,882,232 75; 1872, $5,427,290 37; and up to June 30, 1873, they reached $2,510,608 08. The steamers of four lines, English, French, German, and Chilian, numbering 59, are engaged in the carrying service between Callao and Panama, and Callao and the southern ports of Chili, and also between Callao and European ports *via* the straits of Magellan. The steamers touching at only the principal ports on the coast are weekly, and those calling at all ports semi-weekly. The coasting trade is very extensive, and is carried on, besides the steamers already referred to, by a Peruvian merchant navy comprising (in 1869) 95 vessels with a total of 9,596 tons, 11 being steamers, with an aggregate of 435 tons. Lake Titicaca is now navigated by steamers plying regularly between Puno and the Bolivian ports on the S. E. shore; and the thorough exploration of the eastern rivers, after seven years of constant labor, has been terminated, the hydrographical commission having arrived about the middle of 1874 within 140 m. of the terminus of the Oroya railway. There is a regular service of steamers on the Huallaga and the Ucayali.—The following government railways are completed or in process of construction (1875) under the direction of the American contractor Henry Meiggs:

LINES.	Length.	Cost.	Year of completion.
Callao and Oroya.........	130 m.	$25,875,000	1874
Mollendo and Arequipa...	107	11,250,000	1870
Arequipa and Puno......	222	30,000,000	1873
Puno and Cuzco.........	230	23,437,500	1874
Chimbote and Huaraz....	172	22,500,000	1876
Ilo and Moquegua	63	6,281,250	1872
Pacasmayo, Guadalupe, and Magdalena.........	83	6,656,250	1873
Total................	1,007 m.	$126,000,000	....

The following railways belong to private individuals: Cerro de Pasco to Pasco (silver mines), 15 m.; Iquique to the Noria, 37 m.; Pisagua to Sal de Obispo, 35 m.; Eten to Ferreñafe, 28 m. The following state railways were contracted for by private individuals, to be completed in 1876:

LINES.	Length.	Cost.
Tacna to Bolivia (government share in this line $75,000)......................	108 m.	$5,625,000
Lima to Huacho...	89½	3,750,000
Pisco to Ica (finished 1873)...........	48	1,364,063
Payta to Piura........................	63	1,687,500
Lima to Pisco.........................	144	9,375,000
Huacho to Layan......................	36	2,250,000
Total	488½ m.	$24,051,563

The following lines are projected, all but the three last by the government: Oroya to Chancamayo, 80 m.; Tacna to Puno, 301 m.; Salaverry to Ascope, 40 m.; Oroya, Jauja, and Ayacucho, 240 m.; Chancay to Cerro de Pasco, 120 m.; Trujillo to Eten, 148 m.; Huacho to Lambayeque, 560 m.; total, 1,489 m. The aggregate cost of these lines was to be $210,000,000. The following lines, costing $6,000,000, belong to English companies: Arica to Tacna (6 per cent. security), 39½ m.; Callao to Lima, and Lima to Chorillos, 15½ m.; total, 55 m. When the foregoing lines are completed, Peru will have an aggregate of 3,194½ m. of railway (exclusive of a branch of the Arequipa and Puno railway, to be extended to La Paz in Bolivia), at a cost of about $390,000,000; to which should be added at least $35,000,000 for water works, besides the immense sums required for the ramifications of some of the lines, which cannot be estimated at less than $125,000,000. Except those on the table lands, there are few good common roads in the country, and the internal carrying is almost exclusively performed by mules, llamas, and Indians. There was in 1873 about 1,000 m. of telegraph in the republic, but the service was neither efficient nor productive. Many of the lines pass over barren deserts, traversed only by the muleteers and Indians of the coast, and the distances between the stations are very long. All the lines now belong to the state. A coast cable is shortly to place Payta in communication with Panama, and another will extend to Chili; both were contracted for in 1874; they will connect with the great Atlantic telegraph network.—The present constitution of Peru was promulgated on Aug. 31, 1867. The legislative power is vested in a senate and a house of representatives, the former composed of two deputies for each province, and the latter of representatives appointed by the electoral colleges of provinces and parishes, at the rate of one member for every 20,000 inhabitants. The deputies to the provincial colleges are chosen by the parochial electoral colleges, who in turn send representatives to congress. In 1872 the senate comprised 40 members, and the house of representatives 80. The president and vice presiden are elected by the people for a term of five years. The president is aided by five ministers appointed by himself, respectively in charge of the departments of the interior, foreign affairs, finance and commerce, justice, and war and the navy. The judiciary comprises a supreme court, and superior and lower courts; and the various municipalities are decentralized. The general officers of the army are one grand marshal, four generals of division, and 26 generals of brigade. There are eight battalions of infantry, with 270 officers and 5,600 men, exclusive of about 5,500 gendarmes; three regiments of cavalry, with 120 officers and 1,200 men; and two regiments and one squadron of artillery, with 100 officers and 1,000 men; total strength, 8,290. The artillery in 1873 had 56 pieces of cannon, 36 of which were rifled. The navy consists of six ironclads, mounting 38 guns, and six other steamers with an armament of 56 guns; total, 94 guns. These vessels were for the most part built in London. The national revenue is mainly derived from the custom house, the sale of guano, and miscellaneous receipts, such as licenses. The constitution provides for security of person, life, property, domicile, and correspondence; for individual liberty, and liberty of assemblage (without arms), conscience, and industry; free trade, free teaching, and a free press; and absolute equality before the law. The revenue in 1873 was $23,499,653, and the expenditures were $17,380,406. The foreign debt is made up as follows: loans of 1860-'64, at 4½ per cent., £1,300,000; consolidated 5 per cent. loan of 1865, £10,000,000; railway 6 per cent. of 1870, £11,920,000; railway 5 per cent. of 1872, £15,000,000; total, £38,220,000, or $196,100,000. The 6 per cent. loan of 1870 was issued at the price of 82½, and the 5 per cent. loan of 1872 at 72. The loan of 1872 was intended to be for the nominal amount of £36,800,000, but provisionally there was issued (in July, 1872) only £15,000,000. All these loans, secured by the guano deposits and other resources of the country, are payable in 20 years by means of sinking funds.—The public institutions of Peru, including the palace of industry and several benevolent institutions, are mainly in the capital. The postal service is thoroughly organized. There are in Lima nine banks, five insurance establishments, mostly branches of British companies, and two agricultural associations. The aggregate capital of these institutions is estimated at $190,000,000.—In no country of Spanish America has public instruction been the object of more sedulous care than in Peru. The number of pupils is set down at 100,000 in the various educational establishments of the republic, comprising primary and grammar schools for both sexes, distributed through the various towns and villages, and in the capital normal schools, schools of arts and trades, agriculture, commerce, mines, fine arts, and a naval and military school; besides which there are the six universities of Lima (considered the first in South America), Arequipa, Puno, Cuzco, Ayacucho, and Trujillo. Education is compulsory and gratuitous. The religion of the state is the Roman Catholic, the public exercise of no other being lawful.—The earliest history of Peru is that of the incas, whose empire at the height of their power extended from Quito to the Rio Maulé in Chili, and eastward to the eastern slope of the Andes, and southward as far as Tucuman. In this region there were nations of different language and origin gradually brought under the inca sway. The incas themselves seem to have sprung from a tribe of the Quichuas, who were widely scattered, nearly through the whole length of the empire, divided by tribes of other families, and who still form the mass of the Peruvian population. By a careful census in 1796 they were estimated at 934,000. Their language, often called that of the incas, was harmonious and became highly cultivated. It was adapted to poetry, and dramas, love songs, and poems were composed in it before and after the Spanish conquest, and are still popular. That entitled *Ollantay* has been published, and gives a favorable idea of their culture. In early times the *haravecs* or bards and *amantas* or literati preserved their annals and literature by means of *quipus* or knotted cords. The coast was occupied by the Yuncas, whose capital was at Gran Chimu, near Trujillo, and who had a famous temple at Pachacamac, and an oracle at Rimac. Remains of this people still exist at Moche and Eten, retaining their ancient language, which is entirely distinct from the Quichua. The Aymaras extended from the western shore of Lake Titicaca down into Bolivia, with Quichua tribes around them. They still hold their own, a sombre people, with disproportionate trunks, and rather undersized. Their language differs in many terms from the Quichua, but the great majority of words are the same and the grammatical structure is identical. East of Lake Titicaca were the Puquinas, who seem to have been of the Aymara stock, and the still wilder Uros, living on rafts in the lake. Tiahuanaco, near Lake Titicaca, has rude stone dolmens and rude pillars like Stonehenge, and later structures evincing a highly advanced state, consisting of monolithic gateways covered with sculptures, differing entirely from all other monuments in Peru, whether Aymara, Inca, or Yunca. Manco Capac, the first inca, appeared according to the traditions, with his sister Mama Oello, on Titicaca island, a spot ever after held holy. These two, claiming to be children of the sun, were regarded as deities. Manco Capac proceeded northward, and, founding Cuzco at the spot where his golden staff sank into the ground, introduced civilization and the arts. A powerful kingdom arose, and gradually absorbed the neighboring tribes. Capac Yupanqui, the fifth inca, reduced the Aymaras, and four years afterward the Quichuas. His successor conquered the Chancas or Antis, who had forced their way into his territory. The Chincha or Yunca monarch of Chimu fought desperately, but was at last conquered by Pachacutec, and the incas then overran the coast. They compelled all the conquered nations to adopt their sun worship, but they spared the temples of the idols Pachacamac and Rimac, which were held in great veneration, though they erected sun temples near them. The last exploit of inca power was the annexation of Quito, but this led to a civil war which made Spanish conquest easy. There is great difficulty in ascertaining the precise date of the accession of the first inca, which tradition refers to the opening of the 11th century, while some writers carry it back to within 500 years of the deluge, and fancifully bring the new race from Armenia to the shores of Titicaca. The ruling inca, as son of the sun, and a lineal descendant of Manco Capac, was at once sovereign and pontiff, exercising absolute authority. His person was sacred in life, and his body after death received divine honors. He had many wives, but the principal one, whose eldest son was heir to the throne, must be his eldest sister, or, if he had no sister, his nearest kinswoman (cousin, niece, or aunt). His concubines were numerous. The heir was educated by the *amautas* or sages; but before his admission into the *huaracu* (a sort of knighthood) he was nowise distinguished from the inca's other sons. The empire and the capital were divided into four quarters, corresponding to the cardinal points, each in the rural districts governed by a viceroy; the inhabitants were divided into groups of 10,000, under a native chief and inca governor; and these into subgroups of 1,000, 100, and 10, with appropriate officers, each responsible to those above him. The right of every individual to a portion of the earth sufficient to support life was clearly recognized. All cultivable lands were divided into three parts: one devoted to the support of religion, another to the inca, and the third to the people at large. Each Peruvian received a portion of land called a *topu*, producing maize enough for a man and his wife; on the birth of a son he received another topu, and on the birth of a daughter half a topu. On the death of an individual his land reverted to the state for reallotment. Children were obliged to follow the professions of their fathers, and must not receive an education superior to their position in life. No one could change his residence without permission from his superior. "Tell no lies," "Do not kill," were the concise terms in which the laws were promulgated. Idleness was severely punished, and homicides and robbers were put to death; but those who sinned against religion or the sacred majesty of the inca were burned or buried alive, with their families and friends, their houses were levelled, the trees on their lands cut down, and the lands themselves laid waste. When a province rebelled against the emperor, all the males in it were slain. The first care of the incas, after reducing a nation or province, was to gradually mould its people into the Quichuan system, reinstating over them their own chiefs in the capacity of officers of the empire. The Quichuan language was taught to the children of the new vassals, and took the place of their own. To secure the new acquisitions from rebellion, colonies of from 8,000 to 10,000 individuals, from provinces of tried fidelity, were settled in the subjugated territory, in place of an equal number removed thence to other parts of the empire; and to reconcile these colonists to their new conditions, they were invested with many privileges and treated with marked partiality. Thus by a complex system of liberality and severity, persuasion and force, the inca empire was not only extended, but the conquered nations were effectually amalgamated and moulded into a compact whole. Not content, however, with concentrating in themselves the functions of government and religion, the inca stock monopolized also the advantages of instruction and all that there was of science. Their wisdom was chiefly political and practical. Territorial extension being their leading object, military science received their closest attention; but none were highly educated, even in this department, except the young men of the blood royal. When the monarch died, or, as it was termed, was "called home to the mansion of his father, the sun," his body was embalmed and invested with royal robes, seated in a chair of gold, in the great temple of the sun in Cuzco. His obsequies were performed with the greatest pomp, and his favorite servants and wives were buried with him.—In 1512 Vasco Nuñez de Balboa, the Spanish governor of a small colony in Darien, was informed by a son of the cacique Comogra that there was a country to the southward where gold was in common use, and of as little value among the people as iron among the Spaniards; but his attempt to discover it was unsuccessful. A portion of the coast was explored in 1522 by Pascual de Andagoya. In 1524 Francisco Pizarro reached the coast, in company with the vicar Hernando de Luque and Diego de Almagro, an illiterate adventurer like himself; but he immediately returned to Panama, whence he had set out. A second and equally fruitless attempt was made by the adventurers in 1526. In January, 1531, having obtained the title of *adelantado gobernador* and captain general of all the territory he should conquer, Pizarro again set sail with his four brothers and a small band of men, leaving Almagro behind to procure provisions and reënforcements, and landed at St. Matthew's bay, about lat. 1° N., after a voyage of about 14 days. The adventurers plundered a town in the province of Coaque; and being reënforced by the arrival of about 130 men, they began building a town in the valley of Tangarala, calling it San Miguel. The empire of the incas, having been divided into two branches, Cuzco and Cajamarca, was now distracted by civil war between the two brothers Huascar of the former and Atahuallpa of the latter, to whom their father Huayna Capac had bequeathed equal shares of his kingdom. Atahuallpa had recently gained a complete victory over his brother and taken him prisoner, and was now encamped with his army at Cajamarca, whither Pizarro marched to meet him, in September, 1532, at the head of 177 men. Received with apparent friendship, he managed treacherously to make the inca captive without losing one of his own men. The Peruvian army fled in dismay. Atahuallpa offered as the price of his liberty to fill the apartment in which he was confined with gold; but after the precious ornaments of the temples and palaces had been contributed in amount equal when melted down to more than $17,500,000, Pizarro caused his royal captive to be put to death, Aug. 29, 1533. The Spaniards now marched toward Cuzco, the ancient capital, entered it on Nov. 15, and proclaimed as inca a half brother of Atahuallpa, named Manco Capac. Meantime the captive Huascar had been slain by order of Atahuallpa a short time before the latter's death. Pizarro now determined to build a new capital near the coast, and the valley of the river Rimac was selected as its site. It was founded Jan. 6, 1535, and called Ciudad de los Reyes, or "city of the kings;" its present name has probably been derived from that of the river, corrupted by the Spaniards into Lima. Manco Capac, exasperated at the treatment he received, escaped from Cuzco, placed himself at the head of an insurrection, besieged and set fire to the city, and ordered the massacre of many of the Spaniards who resided on farms cultivated by the forced labor of the Indians. Reënforcements were cut off; Jauja was also attacked, and Lima was threatened; but the Peruvians, to avoid starvation, were at last obliged to raise the siege in order to cultivate their fields. Shortly afterward a dispute between Pizarro and Almagro led to open warfare, and a battle was fought April 26, 1538, resulting in the defeat and capture of Almagro by Pizarro's brother Hernando, and his subsequent execution. The condition of the country was now deplorable. All the ancient institutions were overthrown, and the rights of Indians and Spaniards were equally disregarded. The conquerors had apportioned the land and inhabitants together as the spoils of victory; the Peruvians were reduced to the most abject servitude, and Manco Capac had little difficulty in raising them to arms whenever he saw fit. Pizarro prepared to establish military settlements in the country, strongly fortifying the houses, and giving to each settler a certain portion of land and a certain number of serfs to cultivate it. Reports of these oppressions finally reached Spain, and in 1540 Vaca de Castro was sent out as judge royal to examine into and if possible put an end to them, or in case of Pizarro's death to produce his warrant as royal governor. But before he could reach Lima Pizarro had been assassinated (June 26, 1541) at the instigation of Almagro's son, who proclaimed himself governor, collected a considerable force, and gave battle to Castro near Jauja, Sept. 16, 1542. Defeated after an obstinate struggle, Almagro was made prisoner and put to death, and Castro applied himself with considerable success to improving the condition of the country. But he was soon superseded by Blasco Nuñez Vela, who came as viceroy, and charged with the execution of new laws, chiefly concerning the gradual or immediate liberation of the Indians, and the establishment of a relatively equitable system of taxation upon them. These measures gave rise to a civil war. Gonzalo Pizarro, the last of that family now left in Peru, assumed the title of procurator general, and, favored by the rashness of the viceroy Vela, who was finally deposed by the *audiencia* or supreme court, soon collected a formidable force, entered the capital, and assumed regal state. A new viceroy, Pedro de la Gasca, was now sent from Spain to reëstablish order. Gonzalo, after an insignificant victory over the royalists at Huarina, was captured in 1548, and executed by order of Gasca. The latter now turned his attention to establishing the government of the country upon a solid basis, and that accomplished he returned to Spain in 1550. With a few trifling exceptions, the colony remained quiet for many years, and the authority of the Spanish crown was completely established. The empire of the incas, with some slight alterations of boundaries, became one of the four viceroyalties of Spanish America. In 1718 the province of Quito was separated from it and annexed to the newly created viceroyalty of New Granada. In 1776 the provinces of La Plata, Potosí, Charcas, Chiquitos, and Paraguay were separated from Peru to form the government of Buenos Ayres; and Guatemala, Venezuela, Carácas, Cumaná, and Chili were formed into separate administrations. The Peruvians under Tupac Amaru, a pretended inca, rebelled in 1780, but were easily subdued. In the war of independence, Peru was the last of the Spanish American possessions to rebel. In 1820 Gen. San Martin, to whom Chili already owed her independence, entered the country at the head of an army of Chilians and Buenos Ayreans, took possession of the capital, and, after a succession of victories, compelled the Spaniards to retire to the interior. On July 28, 1821, San Martin declared Peru independent, and was unanimously proclaimed protector. He afterward became unpopular, and was constrained to resign on Aug. 19, 1822; and in February, 1824, Bolivar was made dictator. The Spaniards, after an obstinate contest, were finally defeated by Gen. Sucre in the memorable battle of Ayacucho, Dec. 9, 1824. In January, 1826, they were driven from Callao, their last stronghold in Peruvian territory. Bolivar resigned the dictatorship in 1825, after having matured his plans for separating the S. and S. E. provinces to form a new republic which adopted his name. A revolution took place in 1826; the constitution promulgated by Bolivar was abolished, and a new one, founded upon that of the United States, was adopted in 1827. In 1836 Santa Cruz, president of Bolivia, entered the country with an army, and was proclaimed supreme protector of the Bolivio-Peruvian confederation, which lasted till 1839. In May, 1837, war was declared against Chili; but peace was restored in November of the same year. A congress assembled, and Gamarra, who then governed provisionally, was appointed president. He was killed in battle in Bolivia in November, 1841, and Menendez, president of the council of state, succeeded him, but was forcibly deposed in August, 1842, by Gen. Forico. A series of civil wars now ensued during the successive administrations of Vidal, Figuerola, and Vivanco; but Gen. Castilla brought them to an end in 1844, and replaced Menendez in power. Castilla himself was subsequently elected president, and inaugurated on April 1, 1845, and for six years peace and order were maintained, and the material interests of the country were developed in a degree hitherto unparalleled. In 1851 Gen. Echenique was elected president. His government was accused of the grossest frauds, and Castilla stirred up a revolution in the south, overthrowing Echenique in 1855. Peru was now placed at the disposal of Castilla; but Vivanco incited an insurrection against him, and gained over the commanders of all the ships of war then on the coast, except a small steamer which was protected by the mole of Callao. The fleet threatened to take Callao, and Castilla garrisoned it with a force of nearly 400 Europeans and North Americans under the command of an artillery officer named Smith, which repulsed Vivanco's attack with such severe loss that he retired to Arequipa, a place which had always been faithful to his party. His fleet kept possession of the sea, and at one time held the Chincha islands. On Jan. 24, 1858, two American vessels, the Lizzie Thompson and Georgiana, were captured while loading guano on the coast of the province of Arequipa, by a small steamer of Castilla's; and several other ships were subsequently seized under similar circumstances. The Peruvian government in 1873 paid with interest the amount claimed by the owners of the vessels for damages. Arequipa was taken by assault by Castilla in March, 1858, after a most obstinate and gallant defence. Though slavery was abolished in Peru by the charter of independence, it still existed till Castilla freed the slaves by proclamation in 1855. In 1859 and 1860 the port of Guayaquil was blockaded by a Peruvian force; and in the latter year Castilla landed troops and proclaimed Franco, a minion of his own, president of Ecuador; but the new ruler, having no means of enforcing his authority except those supplied by his ally, was shortly afterward obliged to leave the country. All efforts to overthrow Castilla's government failed. An attempt was made to assassinate him in the streets of Lima in August, 1860, followed by a more serious one three months afterward, when a company of soldiers entered his house early in the morning. Castilla managed to escape in his shirt to the street, and the soldiers shot the officers in charge. A long contest ensued between the Vivanco and Castilla parties; but the latter was enabled to retain the power till the expiration of Castilla's term. In May, 1862, Gen. San Ramon was elected president; he entered upon his functions in October of the same year, and died in April, 1863. His administration was marked by conciliatory tendencies. The Spaniards having in 1864 (Gen. Pezet being in power at the time) seized the Chincha islands, a war ensued; but peace was concluded in January, 1865, the Peruvians agreeing to pay a war indemnity of $3,000,000, and the Spaniards to restore the Chincha islands. This treaty gave much dissatisfaction. Pezet was decreed a traitor, and the vice president Canseco was called to replace him. The treaty with Spain was rejected in November by Prado, who had meantime been appointed provisional dictator, and who in December concluded a treaty of alliance with Chili, and in January, 1866, declared war against Spain. On May 2 the Spaniards were defeated by the allies, and on the 10th they withdrew from the Peruvian waters. In 1867 the present constitution was adopted, and a treaty of friendship, commerce, and navigation was signed between Chili and Peru. At the end of that year a revolution broke out against Prado, and he was compelled, on Jan. 10, 1868, to resign his office and embark for Chili. On July 28 Col. Balta was proclaimed president, and he was assassinated in July, 1872, at the instigation of Gen. Gutierrez, then minister of war. As soon as peace was restored, Don Manuel Pardo was elected president almost unanimously, and his administration has thus far been peaceful, with prosperity in every branch of national industry. Railways have been rapidly extended, river navigation inaugurated, telegraph wires spread over the land, the finances reorganized, and education placed within the reach of all. Nevertheless, an attempt was made to assassinate him in August, 1874. Peru was visited in 1868 by a disastrous earthquake, which, with its accompanying tidal wave, laid waste several towns, both on the coast and in the interior. (See ARICA, AREQUIPA, CALLAO, and LIMA.)—See Prescott, "History of the Conquest of Peru" (2 vols., New York, 1847); Rivero and Tschudi, "Peruvian Antiquities," translated by F. L. Hawks (New York, 1855); C. R. Markham, "Travels in Peru and India" (London, 1862); "Reports on the Discovery of Peru," translated and edited by C. R. Markham (London, 1872); V. F. Lopez, *Les races aryennes du Pérou* (Paris, 1873); T. J. Hutchinson, "Two Years in Peru, with Explorations of its Antiquities" (London, 1873).

PERUGIA. I. A central province of Italy, also called Umbria, formerly a delegation of the Papal States, bordering on Arezzo, Pesaro ed Urbino, Ancona, Macerata, Ascoli-Piceno, Aquila, Rome, and Siena; area, 3,720 sq. m.; pop. in 1872, 549,601. Almost the entire surface is covered with spurs of the Apennines, the main chain of which runs along the N. and E. frontiers. The Tiber flows through the middle of the province. Although the face of the country is generally hilly, there are many wide and fruitful plains. The principal products are corn, wine, fruits, oil, and silk. Cattle, sheep, and swine are numerous, and much attention is paid to the rearing of poultry and bees. Large supplies of wood are sent to Rome. The chief manufactures are cotton, woollen, and silk goods. The province is divided into the districts of Perugia, Foligno, Orvieto, Rieti, Spoleto, and Terni. The lake of Perugia or Trasimeno (anc. *Thrasymenus*) is in the N. W. part of the province, 9 m. W. of the city of Perugia. Its height above the sea is about 850 ft., its length 10 m., its greatest breadth 7 m., and its depth not over 30 ft. It has no visible outlet, and the surface is gradually rising from the constant deposit of alluvial matter. It is surrounded by low hills covered with oaks and pines, and with numerous plantations of olives. It contains the three islands of Polvese, Maggiore, and Minore. Near Passignano, on the N. E. side of the lake, is supposed to be the place of the battle fought in 217 B. C. between Hannibal and the Romans. **II.** A city (anc. *Perusia*), capital of the province, 84 m. N. of Rome, on a high hill, on the left bank of the Tiber; pop. about 18,500. It is surrounded by ancient walls, the greater part of which, with the gates, are well preserved. The most important of the numerous churches are the Duomo or cathedral and the churches of San Francesco and San Domenico. The town house, the old exchange, and the bronze statue of Pope Julius II. are noteworthy. Perugia is a bishop's see, and has a university founded in 1307, with a library of 30,000 volumes, a botanic garden, a mineralogical collection, and a cabinet of antiquities. The academy of fine arts has several good pictures of the Umbrian school. The necropolis of Perugia was discovered in 1840, and several remarkable tombs have been unearthed, disclosing urns, bronze armor and weapons, coins, inscriptions, and other Etruscan remains. The manufactures consist principally of soap, brandy and liqueurs, silks, and woollens.—Perugia is first mentioned in history in 310 B. C., as one of the most powerful cities of Etruria. It was engaged in several wars with Rome, but was ultimately obliged to succumb to its power. In 41 B. C. it became conspicuous in the civil war between Octavius and L. Antonius, the latter throwing himself into the city and sustaining a desperate siege. He was forced to capitulate at the beginning of 40, and Perugia was burned down, having been accidentally set on fire. It soon became again a flourishing city, was a place of much importance in the Gothic wars, subsequently became a free municipal town, suffered greatly from the contests of the Guelphs and Ghibellines, and in 1416 fell into the power of the condottiere Forte Braccio, who made it the capital of his principality. It was not till 1520 that the papal power was firmly established there by Leo X. In 1859 its revolted inhabitants were treated with exceeding severity by the papal troops, and in 1860 it was annexed to the possessions of Victor Emanuel.

Perugia.

PERUGINO, Pietro, an Italian painter, whose true name was Vannucci, born at Castello della Pieve, Umbria, in 1446, died there in December, 1524. He received his first instruction from artists of the Umbrian school, and at the age of 25 visited Florence, where he became the friend and fellow pupil of Leonardo da Vinci. Having painted here a number of works, he returned about 1475 to Umbria, and established himself in Perugia, whence he acquired the name Perugino. In 1480 he was invited by Sixtus IV. to Rome to assist in decorating the Sistine chapel. His frescoes in the exchange of Perugia are considered his principal work. He became one of the most popular painters of Italy, and undertook numerous works, many of which were executed by his pupils from his designs. Gradually he sacrificed his art to love of gain, and his pictures subsequent to 1505 are feeble and mannered.

PERUVIAN BARK. See CINCHONA.

PERUZZI, Baldassare da Siena, an Italian architect, born at Ancajaro, near Siena, in 1481, died in Rome in 1536. The early part of his life was devoted to painting. Subsequently he studied architecture, and is considered the inventor of the architectural perspective painting, afterward perfected by Del Pozzo. One of the best of his works was the Farnesina palace, which was adorned with paintings by Sebastiano del Piombo and Raphael, and with his own fresco of the "History of Medusa." In 1520 he succeeded Raphael as the architect of St. Peter's; but on the sacking of Rome in 1527 he was stripped of his property, and barely escaped to Siena. Returning to Rome, he began the erection of the palazzo Massimi, but did not live to complete it. He died poor, poisoned, it is thought, by a rival architect, and was buried in the Pantheon near Raphael.

PERUZZI, Ubaldino, an Italian statesman, born in Florence, April 2, 1822. He took his degree as an advocate at Siena in 1840, and subsequently graduated at the school of mines in Paris. In 1848 he was sent to Vienna to demand the release of prisoners on behalf of the Tuscan government, and afterward became gonfaloniere of Florence, but was removed in 1850. He contributed by his writings to the overthrow of the reigning house of Tuscany, became a member of the provisional government in April, 1859, and was afterward envoy to Paris. He continued to represent his native city in parliament. In 1860, when Tuscany was joined to Victor Emanuel's dominions, he was elected as a member for Florence to the parliament of Turin. In 1861-'2 he was minister of public works, and subsequently of the interior till September, 1864, when the Minghetti administration was overthrown.

PESARO (anc. *Pisaurum*), a city of central Italy, capital of the province of Pesaro ed Urbino, at the mouth of the Foglia in the Adriatic, 36 m. N. W. of Ancona; pop. in 1872, 19,900. It is fortified, and has fine churches and palaces, a public library, two hospitals, a foundling asylum, and a theatre. Several of the churches and convents contain valuable paintings. The pottery early made here was long famous, but the manufactures now are unimportant.—The city is first mentioned in history in 186 B. C., when a Roman colony was settled there. It was a flourishing town during the empire, was destroyed by Vitiges in the Gothic wars, was rebuilt in part by Belisarius, became prosperous under the exarchate of Ravenna, and was one of the cities of the Pentapolis.

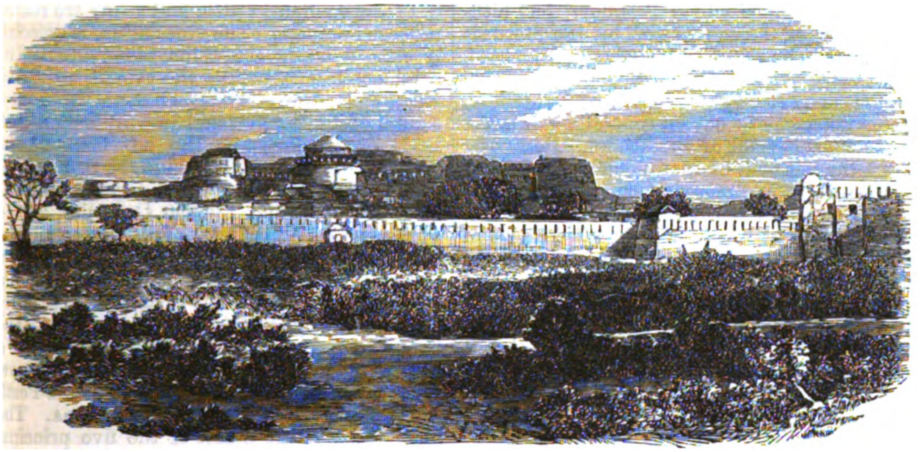
PESARO ED URBINO, a province of the Marches, in the kingdom of Italy, bordering on the Adriatic and the provinces of Forli, Ancona, Perugia, and Arezzo; area, 1,144 sq. m.; pop. in 1872, 213,072, about equally divided between the districts of Pesaro and Urbino. The surface is mountainous. The soil, especially in the valleys, is fertile, producing various sorts of grain, flax, hemp, the olive, and the vine. The principal rivers are the Cesano, Metauro, Foglia, and Marecchia. Cattle, sheep, swine, bees, and silkworms are extensively reared. The province is formed from the ancient duchy of Urbino, and occupies part of the old territory of Umbria. Capital, Pesaro.

PESCARA. See AVALOS.

PESCHEL, Oskar Ferdinand, a German geographer, born in Dresden, March 17, 1826. He studied law in Leipsic and Heidelberg, but accepted a position on the editorial staff of the Augsburg *Allgemeine Zeitung*, and in 1854 took charge of the *Ausland*. In April, 1871, he became professor of geography in Leipsic. Among his publications are: *Geschichte des Zeitalters der Entdeckungen* (Stuttgart, 1858); *Geschichte der Erdkunde bis auf Alexander von Humboldt und Karl Ritter* (Munich, 1865); *Neue Probleme der vergleichenden Erdkunde* (Leipsic, 1870); and *Völkerkunde* (1874).

PESCHIERA, a fortress of N. Italy, on the railroad from Milan to Verona, 20 m. N. by W. of Mantua; pop. about 2,500. It is situated on the Mincio, where it issues from the S. end of Lake Garda, and forms the N. W. angle of the so-called quadrilateral. It was fortified by the Venetians in the 16th century, and was an important point in the operations of Bonaparte and the Austrians in 1796. It was taken by Charles Albert at the close of May, 1848, but was surrendered to the Austrians in August. It was annexed to Italy with Venetia in 1866.

PESHAWER, or **Peshawur.** **I.** A district of British India, in the Punjaub, occupying the N. W. extremity of the Indian empire, bordering on Cashmere, Lahore, and the Afghan province of Jelalabad; area, 1,800 sq. m.; pop. about 500,000. The Khyber, Mohmund, Swat, and Khuttuk mountains form the boundary on all sides except the east and southeast, on which the Indus flows. The province is exceedingly well watered, and is irrigated by canals. The climate is very hot in summer. The soil is naturally fertile; vegetation continues throughout the year, and two harvests are gathered. The principal crops are wheat, barley, maize, millet, ginger, turmeric, tobacco, cotton, various fruits, and an excellent kind of rice called *bara*, because grown on ground irrigated by the Bara river. The road from Hindostan to Cabool and Khorasan by the Khyber pass leads through Peshawer; and the province has been much exposed to the inroads of the wild inhabitants of the mountains. **II.** A city, capital of the province, on the river Bara, in lat. 33° 59′ N., lon. 71° 40′ E., 12 m. E. of the E. extremity of the Khyber pass, and 150 m. E. S. E. of Cabool; pop. about 50,000. It is surrounded by high mud walls, strengthened with bastions, and defended by a fort. When Peshawer was ruled by the Afghans, it contained 100,000 inhabitants; but Runjeet Singh destroyed the fine houses of the chief citizens, desecrated the mosques, and laid waste the surrounding country. The exactions of the Sikhs were subsequently so heavy that its restoration was prevented, but since its occupation by the British in 1849 all restrictions upon it have been removed, and the town has rapidly increased. Peshawer was founded by the emperor Akbar. Half of the city was destroyed by fire in May, 1875.



Fort of Peshawer.

PESTALOZZI, Johann Heinrich, a Swiss teacher, born in Zürich, Jan. 12, 1746, died in Brugg, Feb. 17, 1827. He was naturally feeble, and grew up awkward and clumsy. His education was meagre, especially in the common branches, but he was tolerably familiar with the classics. The reading of Rousseau's *Émile* induced him to abandon legal and historical studies and engage in educational reform. With a view to extensive experiments, he purchased a barren tract near Birr in the canton of Aargau, commenced a madder plantation in 1767, in connection with a mercantile firm in Zürich, and erected a villa which he named Neuhof. The plantation failed, but he continued his farming operations, and in 1775 opened a school for poor children, and soon had 50 pupils. His plan was to make it a manual labor school, employing the children in summer in field work, in winter in spinning and other handicrafts. Instruction was to alternate with labor in the summer, and in the winter the teaching, which was chiefly oral, was to be communicated while they were at work. The school failed through financial and industrial mismanagement, and in 1780 he was compelled to break it up. He was at this time reduced to great extremities, his property and that of his wife being exhausted. Near the close of the year 1780 he published in Iselin's *Ephemerides* "The Evening Hour of a Hermit." It contained a series of aphorisms on education, and produced a decided effect in Germany and Switzerland. In 1781 appeared the first part of his *Lienhard und Gertrud*, which at once established his reputation as a writer; its object was to enforce the importance of home education and the evils of dissipation, and it has been translated into most of the languages of Europe. The agricultural society of Bern awarded Pestalozzi their great gold medal and a vote of thanks. In 1782 he published *Christoph und Else*, a supplement to his "Leonard and Gertrude," but far less popular. Several other of his works of a philosophical character were published between this period and 1798. He also edited during a part of this time *Das Schweizerblatt für das Volk*. In 1792 he visited Germany. He was about to open an educational institution in the canton of Aargau when, in September, 1798, Stanz in Unterwalden was burned by the French, the entire canton laid waste, and a multitude of orphan children were left homeless. Legrand, then at the head of the Swiss directory, called upon Pestalozzi to go to Stanz and take care of those destitute children, and for ten months he taught, fed, and trained 80 children, under the most difficult and distressing circumstances. He was interrupted by the French, who in their retreat visited Stanz again, and turned the convent where Pestalozzi was teaching into a hospital. After a few months he obtained permission to teach in a primary school at Burgdorf, in the canton of Bern. A year later an attack of pulmonary disease compelled him to relinquish his labors, and about the close of 1800, with Krüsi, Tobler, and Buss, he opened an educational institution at Burgdorf, which may be regarded as his first systematic attempt to reduce to practice the principles of education shadowed forth in his "Leonard and Gertrude" nearly 20 years before. He now gave to the world a full exposition of his educational views in *Wie Gertrud ihre Kinder lehrt* ("How Gertrude teaches her Children," Bern and Zürich, 1801). This work had a wide circulation, and attracted not only private friends of education, but deputations from several of the European governments, to visit the institution at Burgdorf. In 1804 another revolution occurred in the government, and the castle at Burgdorf which Pestalozzi had hitherto occupied being wanted by the Bernese government, he removed his school to Buchsee, where the government assigned him a monastery, close by Hofwyl, the estate of Fellenberg, who soon came to have a controlling interest in the management of the school. Pestalozzi found the methods of management introduced by Fellenberg so different from his own, that in 1805 he removed his institution to Yverdun in the canton of Vaud. Teachers were sent to him for instruction, and the Pestalozzian system was formally adopted by the Prussian and other German governments. But dissensions soon sprang up among his teachers. Schmid, indispensable to Pestalozzi for his financial skill and executive ability, was haughty, stern, and overbearing; and in 1810 a disturbance occurred, which was only quieted by his leaving the institution. There was no one left who could fill his place; Pestalozzi himself had no skill in financial management or discipline, and in 1814 the downward tendency of the institution necessitated Schmid's return. In 1816 12 of the teachers, unable to remain with Schmid, resigned at once; among them were Krüsi and Buss. This was followed by a seven years' lawsuit, arising out of the pecuniary affairs of the institution, which was finally settled by arbitration. Meantime the school was losing ground; a poor school at Clindy, intended as a sort of appendage to the institution at Yverdun, was maintained for five years, but in 1825 was broken up, and Pestalozzi retired to the home of his grandson at Neuhof, where he wrote his *Schwanengesang* ("Song of the Dying Swan") and *Meine Lebensschicksale als Vorsteher meiner Erziehungsanstalten in Burgdorf und Iferten* ("Fortunes of my Life, as Principal of my Educational Institutions at Burgdorf and Yverdun"). A complete edition of his works, some of which are philosophical or political, was published simultaneously at Stuttgart and Tübingen (15 vols., 1819-'26), the profits of which he devoted to the school founded in 1818. L. W. Seyffarth has edited a new edition (16 vols., Brandenburg, 1871-'2.) For an outline of his principles, see EDUCATION, vol. vi., p. 414.—See Pestalozzi's *Selbstbiographie* (1826); Biber, *Beitrag zur Biographie Heinrich Pestalozzi's* (1827; English translation, "Life and Trials of Henry Pestalozzi," Philadelphia, 1833); "Pestalozzi and Pestalozzianism," edited by H. Barnard, LL.D. (New York, 1859); and Morf's *Zur Biographie Pestalozzi's* (1864-'6).

PESTH (Hung. *Pest*). **I.** A central county of Hungary, bounded W. in part by the Danube, and E. in part by the Theiss; area, 4,196 sq. m.; pop. in 1870, 775,030, chiefly Magyars, Germans, Slovaks, and Jews. It is the most populous county of Hungary, and the largest after Bihar. The surface is mostly level; only the district W. of the Danube is mountainous. The soil is generally sandy. The Danube forms several islands, the largest of which is Csepel, S. of the capital. Cattle and swine are reared in large numbers. The vine culture is especially carried on in the Buda mountains. The principal towns, besides the capital, are Buda, Kecskemét, Körös, and Waitzen. **II.** A city, capital of the county, and in conjunction with Buda of Hungary, on the left bank of the Danube, opposite Buda, 135 m. E. S. E. of Vienna; pop. in 1870, 200,476 (against 132,651 in 1857), including 136,890 Catholics, 22,344 Protestants, 39,386 Jews, and other sects. The approach to the city by the Danube presents a magnificent appearance, though it is built on a sandy plain. It has lately surpassed most other cities of Europe in the ratio of increase. The banks of the river are now provided with a good embankment, and there are several new bridges in addition to the grand Buda-Pesth suspension bridge described under BUDA. The inner town is the oldest of the five principal divisions of the city, and contains together with the Leopold town the finest residences and extensive quays, partly lined with magnificent structures. New boulevards and streets with tramways are now rising on the site of squalid dwellings, and a new quarter with palatial mansions has sprung up in the fashionable region round the museum and the diet building; and 24,000,000 florins have lately been appropriated for improvements. The New square is one of the largest in Europe, and there are several other squares and many capacious thoroughfares, to which the costumes of various nationalities and the general animation impart a picturesque appearance. There are many fine gardens and promenades; the principal of the latter is the "city grove." The largest church is the Roman Catholic in the Leopold town. Altogether there are about 30 places of worship, including several for Protestants, Greeks, and Jews; the new synagogue is one of the finest edifices in the city. The diet occupies an elegant building. Among other noticeable public buildings are excellent theatres, the casino (a brilliant resort), the new city hall, and new post and telegraph offices. An additional reservoir has been lately constructed, and there are also new docks. In 1871, 700,000 florins were appropriated for education, and the city abounds in schools, religious and secular, and for different nationalities, and has a commercial academy, a good military academy (called Ludovica and reopened in 1872), and several gymnasiums, of which the Piarist is the most celebrated. A new academy of music was established in 1875 under the direction of Liszt. The university of Pesth ranks in the Austro-Hungarian monarchy next to that of Vienna. The students increased from 1,312 in 1861 to 2,296 in 1873, more than half devoted to law and political science, and it has about 140 professors. Attached to it are a botanic garden, a museum, and the Buda observatory and printing establishment. The national library has 200,000 volumes, and the university library 105,000. A new and beautiful building was opened in 1866 for the Hungarian academy; and there are many other scientific and literary associations. The national museum contains varied collections, and Pesth is generally remarkable for artistic and intellectual enterprise and as a centre of the book trade. Among the numerous charitable institutions are orphan, insane, and blind asylums, and one for destitute public servants. Pesth is a great centre of railway traffic and of navigation, and the granary of the whole empire, the exports of flour averaging annually about 4,000,000 quintals. There are many steam flour mills and brandy distilleries, and cattle, wool, wine, leather, timber, soda, and potash are among the other important articles of trade. The "First Hungarian Leather Manufacturing Company" works up annually 100,000 hides. A large foundery is in operation, and silk, cloth, hats, oil, tobacco, and agricultural machinery are manufactured, though much of the latter is imported from England. There are four annual fairs. The increasing importance of the city led the English government to establish a consulate general here in 1871, and there are now several other foreign consuls. The principal languages are the Magyar and the German; English is much cultivated by the educated classes, as well as foreign languages generally; while the Slovak, Serb, and other Slavic dialects are spoken by many of the populace.—The origin of Pesth is ancient. The Romans had a colony on its site, called Transacincum. It is mentioned as a town in the 11th century, and was destroyed by the Mongols in 1241, but having been rebuilt became flourishing at a later period, when Buda was made the capital of the kingdom. The diets and elections of kings were then held on the neighboring plain of Rákos, in the open air, nobles, magnates, and priests assembling in arms, and dwelling under tents. After the battle of Mohács (1526), Pesth was for 160 years in the hands of the Turks, until the conquest of Buda (1686) ended their sway in Hungary. Early in the 18th century it was made a royal free city, and from that time its growth was continuous down to 1848–'9, interrupted only for a short time by a disastrous inundation in March, 1838. Its great revolutionary day was March 15, 1848. The Hungarian national assembly was opened there July 5. The city was evacuated by the revolutionary government and army at the beginning of 1849, reoccupied by the troops under Aulich in April, and repeatedly bombarded by Hentzi during the siege of Buda in May, on which occasion about 60,000 of the inhabitants found refuge in the "city grove," living there under tents. The Hungarian independent government established itself there and in Buda in June, but abandoned it in July. After the surrender of Comorn it witnessed the execution of Count Louis Batthyányi (Oct. 6), of Csányi, Perényi, Jeszenák, and other patriots. At that time thousands withdrew to the rural districts, and Pesth was for a time comparatively deserted. After the disasters of the Austrians in Italy, however, it again became the centre of national agitation, culminating in the assemblies of the county board, the commune, and the "national club," in February and March, 1861. In 1867 the emperor of Austria signed at Pesth the Hungarian constitution, and he and the empress were crowned here on June 8.

PETAU (Lat. PETAVIUS), **Denis**, a French chronologist, born in Orleans, Aug. 21, 1583, died in Paris, Dec. 11, 1652. He was trained from childhood to speak Greek and Latin, besides acquiring Hebrew and Arabic. In 1602 he obtained in a competitive examination a chair of theology in the university of Bourges. In 1605 he entered the novitiate of the society of Jesus at Nancy, renewed afterward his course of philosophy and theology in the Jesuit university of Pont-à-Monsson, taught rhetoric successively at Rheims, La Flèche, and Paris, and from 1621 to 1644 he was professor of dogmatic theology in the Sorbonne. Besides several volumes of discourses and poems, and editions of Themistius and Epiphanius, he published *Opus de Doctrina Temporum* (2 vols. fol., Paris, 1627); *Tabulæ Chronologicæ* (fol., 1628); *Uranologion* (fol., 1630; 2d ed. by Hardouin, 3 vols., Antwerp, 1703); and *Rationarium Temporum in XIII Libris* (2 vols., Paris, 1633–'4; several times reëdited and corrected by the author, and translated into French and English). His great theological work is *Theologica Dogmata* (6 vols. fol., Paris, 1644–'50; best ed., 7 vols. fol., Venice, 1758; last ed., 8 vols., Paris, 1865–'7).

PETCHORA, a river of European Russia, which rises in the government of Perm, on the western slopes of the Ural mountains, about lat. 61° 40′ N., lon. 59° E., and flows into the Arctic ocean through a wide estuary in lat. 68° 20′ N., between lon. 53° and 54° E., after a course of 900 m. After leaving Perm it flows very circuitously through the governments of Vologda and Archangel. There are many islands in its lower part. Its chief tributaries are the Usa, Ishma, and Tzylma.

PETEN, a district forming the northernmost portion of Guatemala, in the department of Vera Paz, formerly the home of the Itzaes; estimated area, 20,000 sq. m.; pop. in 1839, the date of the last census, 6,827, almost exclusively Indians. The whole district is well watered. Among the lakes, which are numerous, the most remarkable is that of Itza or Peten, in the centre of which is the island of Peten, whose rocky eminence the Itzaes chose for the site of their temples, and on which was afterward built the Spanish town of Flores. In 1698, after conquering the people, the Spaniards destroyed the edifices, so that scattered heaps of stones are their only remains. More extensive ruins have been discovered during the present century in a forest S. E. of Flores; and on the desert island of Jax-Haa, in a lake E. of that of Peten, is a square tower of five stories, 45 ft. high. (See Itzaes, and Mayas.)

PETER I. (Alexeyevitch), surnamed the Great, emperor of Russia, born near Moscow, June 10, 1672, died in St. Petersburg, Feb. 8, 1725. His father Alexis died in 1676, and was succeeded by Feodor, who died in 1682 without issue, naming Peter as his successor, to the exclusion of Ivan, the latter's elder half brother, who was an imbecile youth. An insurrection followed, fomented by their sister Sophia. The difference was settled after much bloodshed by the joint coronation of Ivan and Peter (May, 1682), with Sophia as regent. In 1789, after marrying Eudoxia Fedorovna Lapukhin, contrary to the regent's wishes, Peter emerged from the inactivity to which Sophia's ambition had consigned him, and, assisted principally by the Swiss Lefort and the Scotchman Gordon, assumed the direction of affairs. He shut up his sister in a convent, where she ended her life in 1704, and banished her minister, Prince Gallitzin. Ivan voluntarily withdrew, leaving Peter in effect sole sovereign, and died in 1696. Peter at once organized a new army, entering the ranks himself, and rising through every grade; and this example he required his nobles to follow. He laid the foundation of a navy by employing Dutch and Venetian shipwrights to build several small vessels on Lake Peipus. He learned seamanship by cruising on board Dutch and English ships at Archangel, the only seaport Russia then had, and sent young Russians to Venice, Leghorn, and Holland for the same purpose. In 1696 he besieged and took the Turkish city of Azov on the sea of that name, and about the same time repudiated his wife on account of her opposing his plans. In order to improve his semi-barbarous subjects, he fostered communication with the western nations of Europe, at whose courts Russia was not then represented; and, sensible of his own deficiencies, he left his dominions for a temporary residence abroad (1697). This journey formed an epoch in the history of his empire. He went first with a few attendants to Saardam, where in disguise he spent a short time, and next worked in Amsterdam as a ship builder, studied natural philosophy, astronomy, and geography, and attended anatomical lectures. Early in 1698 he went to London, but soon removed to Deptford, where he occupied the house of John Evelyn, and returned to Holland in April, taking with him several men of science. He thence proceeded to Vienna to inspect the army, and was about to visit Italy when a rebellion at home caused his return after an absence of 17 months. The insurgents, whom his general Gordon had put down, he punished with savage cruelty. He disbanded the strelitzes, long the body guard of the czars, and formed new regiments on the German model. He regulated the press, established naval and other schools, and required his subjects to trade with other countries, which was formerly a capital crime. He prohibited the wearing of beards, granting exemptions for the payment of a special tax. To the horror of the priests, he altered the calendar, making the year begin on Jan. 1 in the place of Sept. 1 as before, and instituted the order of St. Andrew, the patron saint of Russia. To recover the provinces of Ingria and Karelia, which had formerly belonged to the Russian monarchy, he formed an alliance with Augustus II. of Poland and the king of Denmark against the king of Sweden. The first fruit of the league was the disastrous battle of Narva. (See Charles XII.) Peter applied himself vigorously to repairing his losses, declaring that his enemies would teach him how at length to beat them. He melted down the church bells for cannon, and organized against Swedish invasion a fleet of small vessels on Lake Ladoga. In 1702 he defeated the Swedes and took Marienburg in Livonia. By skilful manœuvring he got possession of the river Neva, at the mouth of which, among marshes which proved destructive to tens of thousands of his laborers, he laid the foundations of St. Petersburg (1703). In 1704 he became master of the whole of Ingria, and appointed Prince Menshikoff viceroy. When Augustus abdicated in favor of Stanislas Leszczynski, Peter entered Poland with an army, assembled a diet, and deposed Stanislas. Charles XII. soon appearing, Peter retired into the interior of his own dominions, but finally achieved a brilliant victory over him at Poltava, July 8, 1709, and in the following year conquered Karelia. Charles, who took refuge in Turkey, instigated Ahmed II. against Peter. A war ensued, in which the czar was narrowly saved from destruction (1711) by the finesse of his mistress Catharine, afterward his wife and successor (see Catharine I.), and the sacrifice of Azov. He built defensive works in his capital; and by the construction of ships, dockyards, and wharves, which gave employment to thousands of laborers, he laid a substantial basis for commerce. In 1713 he removed the senate from Moscow to St. Petersburg, and in 1715 the summer and winter palaces were completed. In company with the empress Catharine he made a second tour of Europe in 1716, and was received at Paris with great splendor. He carried back a large quantity of works of art to adorn the new city. His son Alexis, the child of his first marriage, and heir to his throne, evincing a treasonable spirit, was tried and condemned to death; a few days afterward (July 7, 1718) he died in prison, under highly suspicious circumstances. (See Alexis Petrovitch.) The protracted differences between Russia and Sweden were finally composed, after the death of Charles XII., by the treaty of Nystad (1721), under which Sweden ceded to her rival Livonia, Esthonia, Ingria, a part of Karelia, the territory of Viborg, the isle of Oesel, and all the other islands in the Baltic from Courland to Viborg. For these concessions Russia agreed to surrender Finland, which had been partly conquered, to pay $2,000,000, and to allow a free export of corn, to the annual value of 50,000 rubles, from the ports of Riga, Revel, and Arensberg. Peter now built canals and factories, established a uniformity of weights and measures, and paved the streets of Moscow and St. Petersburg. He framed codes, organized tribunals, and instituted hospitals. To polish the manners of his court, he ordered the young nobles to visit western Europe in company with their wives. In 1723 he founded at St. Petersburg the academy of sciences. His last war was against Persia, in which he gained the Caspian territories of Derbend, Baku, Ghilan, Mazanderan, and Astrabad (1722–'3). At last, afflicted with a dangerous disease, he appointed the empress Catharine his successor and caused her to be publicly crowned a few months before his death.—His bicentennial anniversary was celebrated with great pomp in Moscow and St. Petersburg, June 10, 1872. The Russian government undertook in 1873 to publish his letters and papers, under the direction of Count Tolstoi, minister of public instruction. Among the biographies and works relating to him are those of Halem (3 vols., 1803–'5), Bergmann (6 vols., 1823–'30), and others, in German; Voltaire (new ed., 2 vols., 1864) and Count Philippe Paul de Ségur (1829), in French; and Golikoff (30 vols., 1788–'97) and Ustreloff (6 vols., 1858–'63), in Russian. In 1874 appeared in Paris *Règlement ecclésiastique de Pierre le Grand*, translated from the Russian by Father C. Tontini. See also *Pierre le Grand dans la littérature étrangère*, by R. Minzloff (St. Petersburg, 1875).

PETER II., emperor of Russia, born Oct. 23, 1715, died Feb. 9, 1730. His father, Alexis, was the eldest son of Peter the Great by Eudoxia Lapukhin. The empress Catharine I. named him in her will as her successor on the throne, mainly through the influence of Menshikoff, who seized the control of affairs on the death of the empress in 1727 and the accession of Peter II., then only 12 years old. He designed to perpetuate the influence of his house by intermarriages with the imperial family; but the Dolgoruki family frustrated his ambition and caused him to be banished to Siberia. The young emperor was about to marry a princess Dolgoruki when he died suddenly, and was succeeded by Anna, the widow of the duke of Courland and daughter of Ivan, half brother of Peter the Great, who recalled the Menshikoffs and exiled the Dolgorukis. The male line of Romanoff became extinct on the death of Peter II.

PETER III., emperor of Russia, born in Kiel, Feb. 21, 1728, died at Ropsha, July 17, 1762. He was the son of the duke Charles Frederick of Holstein and of Anna Petrovna, a daughter of Peter the Great, and was first known as Duke Charles Peter Ulric of Holstein-Gottorp. According to the right of succession established by Peter the Great, he was designated in 1742 by the latter's daughter and his aunt, the empress Elizabeth Petrovna, as cesarovitch and successor to the throne; and he was also destined by her, at the suggestion of Frederick the Great, to become the husband of the princess of Anhalt-Zerbst, the future Catharine II. The marriage took place in September, 1745, but he led an unhappy life with Catharine. He ascended the throne on the death of Elizabeth, Jan. 5, 1762, and immediately made peace and an offensive alliance with Frederick the Great, restoring to him the province of Prussia, which had been conquered by the Russians, and supplying him with an auxiliary army of 15,000 men. He was about to take the field against Denmark to enforce the claims of the house of Holstein-Gottorp upon Schleswig, when his wife usurped the throne (July 8–9), and he was deposed, arrested, and strangled in prison. (See CATHARINE II.)

PETER, or **Pedro**, the name of several monarchs of Castile, Portugal, and Brazil. For the more important of them, see PEDRO.

PETER, Saint, one of the twelve apostles, born at Bethsaida in Galilee. He was the son of one Jonas or John, whence Christ calls him on one occasion (Matt. xvi. 17) by the surname Barjona or son of Jonah. His original name was Simon. Before his calling to the apostleship he had married and removed to Capernaum on the lake of Gennesaret, where with his brother Andrew he followed the occupation of a fisherman. It is probable that like Andrew he was a disciple of John the Baptist. It is related by St. John the Evangelist that the Baptist, standing with two of his disciples, saw Jesus pass by, and exclaimed: "Behold the Lamb of God!" whereupon the disciples followed our Lord and remained with him all that day. One of these two was Andrew, who had no sooner discovered that Jesus was the Messiah than he sought out his brother and brought him to our Lord. "And when Jesus beheld him, he said, Thou art Simon the son of Jona; thou shalt be called Cephas, which is by interpretation a stone." (John i. 42.) From the Greek word πέτρος, the equivalent of Cephas, the apostle received the name of Peter, which on a subsequent occasion Christ expressly gave to him, saying: "Thou art Peter, and upon this rock I will build my church." (Matt. xvi. 18.) After their first intercourse with the Saviour, Peter and Andrew returned for a season to their occupation of fishing, and were engaged in washing their nets when Jesus, shortly after the commencement of his ministry, walking by the sea of Galilee, entered into Peter's boat to avoid the pressure of the multitude. Peter had toiled all the night and had taken nothing; but at Christ's command he let down the net again and enclosed a miraculous draught of fishes, so that the net broke with the weight. He now received his call to leave everything and become a "fisher of men," being with his brother Andrew the first chosen of the apostles. His name is always mentioned first in the list of the apostles. He was one of the three selected to witness the transfiguration, and to watch with the Saviour during the agony in the garden of Gethsemane. He frequently appears in the gospels as the spokesman for his companions; he is often specially addressed by our Lord, and it is probable that Christ dwelt at his house in Capernaum. It is the opinion in fact of most, though not of all critics, that he enjoyed a certain preëminence among the apostles, upon which, coupled with the injunction given to him by the Saviour to feed his flock, and the declaration, "Thou art Peter, and upon this rock I will build my church," the Roman Catholics found the doctrine of the supremacy of the popes as Peter's successors. Protestant theologians regard this preëminence as personal and not official, and as conferring honor without any superior authority. The character of Peter, as displayed in the gospel narratives, is one that commends itself particularly to our interest and affection. Ardent, zealous, quick in his faith, and strong in attachment to his divine Master, he yet exhibits, in a more marked degree than is told of his fellow apostles, the common failings of humanity. When Christ walked upon the sea of Galilee to meet his disciples, whose ship was tossed with the waves, Peter with his leave walked toward him upon the water; but becoming afraid he began to sink, and cried, "Lord, save me." Jesus stretched out his hand and caught him, and rebuked his fears, saying, "O thou of little faith, wherefore didst thou doubt?" (Matt. xiv. 29-31.) Again, when Christ predicted his passion and death, Peter remonstrated with him, exclaiming, "Be it far from thee, Lord; this shall not be unto thee," and was severely rebuked for it. (Matt. xvi. 22, 23.) At the last supper during the feast of the passover, when our Lord washed his disciples' feet, Peter at first refused with great vehemence to permit him so to humiliate himself before him. The same night, in reply to a boast of the apostle that he would lay down his life for his Master, Jesus said to him, "The cock shall not crow until thou hast denied me thrice." (John xiii.) Peter was one of the first to whom the Lord showed himself after his resurrection. On a subsequent occasion he had been fishing all night with Thomas, John, James, Nathanael, and two others, and had caught nothing, when Jesus appearing on the shore bade them cast their nets on the right side of the ship, and when they did so it enclosed such a multitude of fishes that they could not draw it up. As soon as Peter knew it was the Lord, he threw himself into the sea in his impatience to come to him. Thrice assuring Christ, in answer to his questions, that he loved him, he was commanded to feed his Master's sheep and lambs; and he was then foretold the sufferings and death whereby he should glorify God, when he should stretch forth his hands, and another should gird him and carry him whither he would not. (John xxi.) After the ascension of Christ, Peter took the lead in the Christian body; and from the descent of the Holy Spirit his character seems to have been changed by an infusion of that strength and dignity which it previously lacked. He is frequently mentioned in the Acts, and always appears as a bold and unflinching preacher of the new faith. He preached to the multitude in Jerusalem on the day of Pentecost with such effect that 3,000 persons were converted and baptized. With John he cured a lame man at the gate of the temple, and was brought before the sanhedrim and commanded to speak no more in the name of Jesus, which injunction he courageously refused to obey. At his rebuke Ananias and his wife Sapphira, who had sold their goods and laid part of the price at the apostles' feet, pretending that it was the whole, were struck dead. After Philip had converted a great number in Samaria, Peter and John went down to them, and laid their hands on them that they might receive the Holy Ghost. (Acts viii. 14, 17.) Peter then returned to Jerusalem, preaching on the way in many Samaritan villages, and afterward went to Lydda, where he cured Æneas of the palsy. At Joppa he raised to life a Christian woman named Tabitha or Dorcas. While lodging here with one Simon, a tanner, he was taught by a vision that the gospel should be preached not only to the chosen people, but also to the gentiles, and was instructed to accompany the three men sent to him by Cornelius, a centurion who dwelt at Cæsarea. Having baptized this man and his household, he returned to Jerusalem, where one of the brethren rebuked him for holding intercourse with the uncircumcised; but on hearing of his vision they held their peace and glorified God. Imprisoned by Herod (A. D. 44), he was released by an angel and went to Cæsarea. He next appears at a council of the apostles and elders at Jerusalem (A. D. 51), when he advocated the exemption of gentile converts from the ceremonial obligations of the Mosaic law. Indeed, it appears that he was chiefly instrumental in establishing at Antioch a church in great part of gentiles. With these he ate promiscuously, not observing the legal distinction of unclean meats. But on the arrival of some Jewish converts from the church over which the apostle James presided, Peter gave up the practice, thereby causing scandal to the gentile converts, and drawing on himself the censure of St. Paul. (Gal. ii. 11-14.) The remainder of his history is derived from allusions in the epistles, and from the traditions of the early fathers. He was employed for the most part in building up and completing the organization of Christian communities in Palestine and the neighboring districts. From the epistles of Paul it seems not improbable that he visited Corinth, and this is distinctly asserted in a letter of Dionysius, bishop of Corinth, to Rome. His first epistle is dated at Babylon, which was then the seat of a Jewish colony, though some understand the name to be used here for Rome. Eusebius says that he was at Rome 20 years, and in this he is followed by Jerome and most Roman Catholic writers, who regard him as the first bishop of Rome. Others maintain that he did not visit Rome before the last year of his life, and some indeed that he was never in Rome. The general tradition of antiquity, however, asserts that he was martyred in that city. Ignatius speaks of him as connected with the church of Rome, and no early writer discredits the tradition. It is said that he suffered about the same time with the apostle Paul, and in the Neronian persecution. Origen says that he was crucified with his head downward at his own request.—St. Peter is the author of two canonical epistles, the first of which was probably written between 45 and 55. It is addressed chiefly to the converted Jews, and its purpose was to confirm them in their faith under persecution, and to confute the errors of Simon and the Nicolaitans. The second epistle is likewise addressed to the Jews, and is supposed to have been written shortly before the apostle's death. Its authenticity has often been doubted, but that of the first epistle is generally unquestioned. They are both glowing and rapid in style, and show good Hellenistic Greek, but no familiarity with Greek authors. Some other writings of very early date were attributed to St. Peter. "The Preaching of Peter" is quoted by Clement of Alexandria, but is very unlike the style of the canonical epistles. "The Revelation of Peter" was much esteemed for centuries, and, according to Sozomen, was read once a year in some churches of Palestine. The most ancient Roman calendar published by Buchericus marks the feast of St. Peter and St. Paul at the catacombs on June 29; and St. Gregory the Great writes that these catacombs were two miles outside of Rome. One half of both bodies is believed by Roman Catholics to be enshrined in the church of St. Paul without the walls, and the other half in a vault of the Vatican church, called from remote antiquity "the Confession of St. Peter" and *Limina Apostolorum*. This latter was the shrine resorted to as a pilgrimage from all parts of Christendom. The heads of both apostles are also said to be preserved beneath the high altar of the basilica of St. John Lateran.—See Ellendorf, *Ist Petrus in Rom und Bischof der römischen Kirche gewesen?* (Darmstadt, 1841; English translation in the "Bibliotheca Sacra" for July, 1858, and January, 1859), and a reply to Ellendorf by Binterim (Düsseldorf, 1842); Ventura, *Lettres à un ministre protestant* (Paris, 1849); Archbishop Leighton, "Practical Commentary on the First Epistle of Peter" (London, 1819); G. F. Simon, *Étude dogmatique sur Saint Pierre* (Strasburg, 1858); and Fronmüller, in Lange's commentary (English translation, vol. ix., New York, 1867).

PETER OF BLOIS, or **Petrus Blesensis**, an ecclesiastical writer, born in Blois, France, about 1130, died in England about 1200. He studied at Paris and Bologna, and was afterward a pupil of John of Salisbury, bishop of Chartres. In 1167 he went to Sicily, where he became tutor to the young king William II., and guardian of the seal; but having excited the jealousy of the Sicilians, he returned to France, and in 1175 accepted an invitation from Henry II. to settle in England, was made archdeacon of Bath and chancellor of the diocese of Canterbury, visited Rome on ecclesiastical business during the pontificates of Alexander III. and Urban III., and in the latter part of his life received the archdeaconry of London. By command of the king he made a collection of his letters, 183 in number; besides which there are extant several of his sermons, treatises on doctrinal and ethical subjects, and a work on canon law and process. His works were published in Paris (fol., 1519; best ed., 1667), and in vol. cvii. of Migne's *Patrologie latine.*

PETER CLAVER, a Jesuit missionary, born in Catalonia in 1582, died in Cartagena, New Granada, Sept. 8, 1654. He entered the society of Jesus at Tarragona in 1602, and in 1610, at his own urgent solicitation, was sent to Cartagena, at that time the centre of the African slave trade. Soon afterward he was ordained priest, and thenceforward all his energies were given to the labor of visiting the slave ships on their arrival in the harbor, of instructing the negroes in the large sheds erected for them on shore, of securing them proper care when sick, and of obtaining for them humane and Christian treatment from their owners. He was allowed, on making his solemn religious profession, to sign himself "the slave of the negroes for ever;" and from that moment he lived among them on shipboard or in the hospitals, in the leprosy hospitals especially, ministering to their every want, and eating nothing but the refuse of their food. He organized a body of catechists, who aided him in instructing the slave population. A few years before his death his exertions to mitigate the horrors of the plague in Cartagena resulted in extreme exhaustion and paralysis. On Sept. 4, 1747, Benedict XIV. declared his virtues heroic, and he was beatified in 1852 by Pius IX. His feast is celebrated on Sept. 9. His life was written in Spanish by Suarez, and in French by Fleuriau (Paris, 1751).

PETER THE HERMIT, the apostle of the first crusade, born of good family in the diocese of Amiens, France, about the middle of the 11th century, died in a monastery near Huy in 1115. After trying several pursuits, he became a hermit, and about 1093 undertook a pilgrimage to Jerusalem, where the oppressions which he witnessed and experienced determined him to arouse the people of Christendom to undertake a war for the liberation of the holy sepulchre. (See CRUSADES.) The first host of crusaders was led by Peter himself. A part of it separated from the rest under the command of Walter the Penniless, and was destroyed in Bulgaria. The principal division reached no further than Nice, where they were defeated by the Moslems. Peter had left them before this, and his name was associated with the succeeding expedition under Godfrey of Bouillon. While the crusaders were besieged in Antioch, he deserted, but was captured by Tancred and brought back. On the conquest of Jerusalem he preached a sermon to the crusaders on the mount of Olives. After this he returned to Europe and founded the abbey of Neufmoutier, near Huy, where he passed the rest of his life. There is a statue in bronze of Peter the Hermit in the place St. Michel in Amiens.

PETERBOROUGH. I. An E. central county of Ontario, Canada, watered by the Otonabee; area, 2,485 sq. m.; pop. in 1871, 30,473, of whom 15,287 were of Irish, 7,949 of English, 4,947 of Scotch, 1,024 of French, and 794 of German origin or descent. It contains numerous lakes, and is connected by a branch with the Midland railway. The surface is undulating. **II.** A town, capital of the county, on the Otonabee river, which is here crossed by a bridge, and on the Midland railway, 67 m. N. E. of Toronto; pop. in 1871, 4,611. The river is here navigable by steamers. The streets are well laid out and are lighted with gas. The town contains several saw and grist mills, manufactories of iron castings, steam engines, machinery, agricultural implements, leather, woollens, wooden ware, &c., and has a large export trade in grain, pork, and lumber. There are four branch banks, three weekly newspapers, and churches of six denominations.

PETERBOROUGH, a city of Northamptonshire, England, on the left bank of the Nene, 37 m. N. E. of Northampton, and 76 m. N. by W. of London; pop. in 1871, 17,429. The cathedral is a fine specimen of Norman and early English architecture. It was founded in 655 by Peada, king of Mercia, but was destroyed by the Danes, and afterward rebuilt. It is in the form of a cross, 476 ft. long, with transepts 203 ft. broad, ceiling 78 and tower 150 ft. high. Catharine of Aragon, wife of Henry VIII., and Mary, queen of Scots, were both buried in Peterborough cathedral; but the remains of the latter were removed by James I. to Westminster abbey. Peterborough is the seat of a bishop, and the dean and chapter exercise a certain jurisdiction over the town.

PETERBOROUGH, Charles Mordaunt, earl of, a British soldier, born in 1658, died in Lisbon, Oct. 25, 1735. His youth until his 17th year was passed in the frivolous and profligate amusements of the court, wearying of which he joined an expedition sent to chastise the Barbary corsairs of the Mediterranean. Having seen severe service at Tripoli and elsewhere, he returned to England, was married, and succeeded to his father's title of Viscount Mordaunt. In 1678–'9 he again served against the Algerines, and on his return to England took his seat in the house of lords as an opponent of the court. Subsequently he showed a strong sympathy for Lord Russell and Algernon Sidney, the latter of whom, in spite of the menaces of Jeffrey, he supported to the last and accompanied to the scaffold. His pecuniary circumstances becoming embarrassed in consequence of a reckless generosity, he went in 1686 to Holland, whence he returned to England with the prince of Orange. In April, 1689, he was created first commissioner of the treasury and earl of Monmouth, but retired from office in a few months with no great credit for political integrity. After serving in the campaign of 1691 on the continent, he lived for several years on his estates; but his restless ambition and vanity, which the king's refusal to recall him to power only inflamed, prompted him in 1696 to engage in the Fenwick plot, and he was for several months a prisoner in the tower. Released by William, and finding himself an object of detestation to both whigs and tories, he again went into retirement, and in 1697 succeeded to the title of earl of Peterborough, inherited from his uncle, Henry Mordaunt. At this time he was reduced to poverty. The accession of Queen Anne opened the path of preferment to him, and by paying court to the duchess of Marlborough he procured the appointment of general-in-chief of the forces sent in 1705 to assist the cause of the archduke Charles of Austria, claimant of the crown of Spain. With 7,000 undisciplined troops, principally Dutch and English, he captured Barcelona, having first carried by assault the almost impregnable citadel of Montjuich, which commanded the city, and, in the face of a vastly superior force having every advantage of position, began a remarkably successful campaign against the supporters of Philip V., the rival of Charles. He quickly overran Catalonia, Aragon, and Valencia, and parts of Murcia and Castile, outwitting and alarming his enemies by the rapidity, secrecy, and mystery of his movements, defeating thousands of men with a mere handful, and not scrupling at any artifice which would insure success or increase his numbers or prestige. The advance in April, 1706, of an army of 20,000 men under Philip V. toward Barcelona, checked the triumphant career of Peterborough, and he hastened back to the city, into which he threw a portion of his forces, while the remainder occupied the heights surrounding the enemy's camp and cut off their supplies. After an obstinate resistance the Barcelonese were relieved by the arrival of a British fleet with supplies and reënforcements, and the besieging force retreated with precipitation, closely followed by Peterborough. Had the advice of the latter been followed at this juncture, and a rapid march made upon Madrid, the archduke might have been established upon the throne of Spain. But dissensions arose among the allied generals, and Peterborough, finding his counsels disregarded, quitted Spain in disgust, and in 1707 returned to England, where he was thanked by the house of lords for his "wonderful and amazing success." In 1710 he was employed on embassies to Vienna and other continental courts. In 1713 he was sent to the king of Sicily, and shortly afterward was made governor of the island of Minorca. Hatred of Marlborough induced him during the last years of Queen Anne's reign to side with the tories; and on the accession of George I. and a whig administration he returned to his country seat. Throughout his life he was the intimate friend of Dryden, Swift, Pope, Gay, and other men of letters, and had a considerable reputation as a writer. He is said to have composed his own memoirs, which after his death were destroyed by his countess, the celebrated singer Anastasia Robinson, with whom he contracted a second marriage in 1735. Macaulay calls Peterborough "the most extraordinary character of that age, the king of Sweden not excepted; . . . . a polite, learned, and amorous Charles the Twelfth." In person he was tall and graceful, but so attenuated that Swift compared him to a living skeleton.—See "Memoir of Charles Mordaunt, Earl of Peterborough and Monmouth, with Selections from his Correspondence," by Eliot Warburton (2 vols., 1853).

PETERHEAD, a seaport town of Aberdeenshire, Scotland, 26 m. N. N. E. of Aberdeen, on a peninsula which is the most easterly point of Scotland, connected with the mainland by an isthmus only ¼ m. wide; pop. in 1871, 8,535. The principal streets are well paved and handsomely built up, chiefly with granite. There are two excellent harbors on the N. and S. sides of the peninsula, connected by an artificial channel. The imports consist of lime, wool, timber, salt, and flour, and the exports of red granite quarried in the vicinity, grain, meal, pork, butter, cheese, eggs, herrings (of which 50,000 bbls. are cured annually), and whitefish. The tonnage entered in 1873 was 75,623 (13,811 in the foreign trade), and cleared 74,287 (15,718 foreign). The manufactures are unimportant, but there is some ship building. Peterhead is frequented in summer by bathers, and there are mineral springs near by.

PETERMANN, August, a German geographer, born at Bleicherode, near Nordhausen, in Prussian Saxony, April 18, 1822. He studied in the academy established at Potsdam by Berghaus, with whom he lived six years as his private secretary and librarian, assisting him in the preparation of his "Physical Atlas." In 1841 he published for Humboldt the map of central Asia. In 1845 he went to Edinburgh to aid A. K. Johnston in the English edition of the "Physical Atlas;" and in 1847 to London, where he became a member of the royal geographical society, and in conjunction with the Rev. Thomas Milner prepared an "Atlas of Physical Geography." To him is due in great measure the aid which Barth, Overweg, and Vogel received from the English government in their African explorations. In 1854 he became superintendent of the geographical institute of Justus Perthes at Gotha, and in the following year he established the monthly *Mittheilungen aus Justus Perthes' geographischer Anstalt*, of which 21 volumes have appeared (1855-'75), besides numerous and valuable supplements. He has efficiently promoted arctic, African, and other explorations. To the new edition of Stieler's *Hand-Atlas*, now (1875) approaching completion, he has contributed some of the finest maps, including a map of the United States in six parts.

PETERMANN, Julius Heinrich, a German orientalist, born in Glauchau, Saxony, in 1806. He studied in Leipsic and Berlin, and graduated in 1829. In 1832 he visited Venice to study Armenian among the Mekhitarists, and in 1837 he became professor of oriental literature in Berlin. In 1865 he visited the East, and in 1867-'8 he was consul at Jerusalem. Besides grammars of Armenian, Arabic, Chaldaic, and Hebrew, he has published *Reise in den Orient* (2 vols., Leipsic, 1860), and many interesting works relating to oriental literature (1868 *et seq.*).

PETERS, or Peeters, Bonaventura, a Flemish painter, born in Antwerp in 1614, died there, according to most authors, July 25, 1652, but according to Valkema in 1671. He was especially distinguished as a marine painter. His best works are now scarce.

PETERS, Christian August Friedrich, a German astronomer, born in Hamburg, Sept. 7, 1806. He was employed in the observatory of that city and afterward of Pulkova, and in 1839 became one of the directors of the latter. In 1849 he was appointed professor of astronomy at Königsberg, and in 1854 director of the observatory of Altona. He has edited *Die Astronomischen Nachrichten* since 1854, and has made various discoveries of asteroids and observations of fixed stars and comets.

PETERS. I. Christian Henry Frederick, a German American astronomer, born at Coldenbüttel, Schleswig, Sept. 19, 1813. After graduating at the university of Berlin he spent several years in travel and scientific explorations in Italy, Palestine, and the region of ancient Troy. He then came to the United States, was connected with the coast survey, and in 1858 was appointed professor of mathematics and astronomy in Hamilton college, and director of the observatory (now the Litchfield observatory), at Clinton, N. Y. In 1859, by exchange of star signals with the observatory of Harvard college, he determined accurately the longitude of his own observatory, and afterward of several other places in the state, and also of the observatory at Ann Arbor, Mich., which was made the fundamental point in the lake surveys of the United States. His last work of this character was the determination of the western boundary of the state of New York. Many of these labors were carried on under the auspices of the regents of the university of the state of New York. Dr. Peters took a prominent part at Des Moines, Iowa, in the observation of the total solar eclipse of Aug. 7, 1869. At his own observatory he has recorded in chronographic sheets over 20,000 solar spots, and has determined and catalogued, down to the 13th magnitude, 16,000 zodiacal stars. He has also invented a polarizing eyepiece for solar work, by which the inconvenience arising from the great heat of large glasses is removed. Dr. Peters was chief of the party sent by the United States government to New Zealand to observe the transit of Venus of Dec. 9, 1874. He sent his assistant, Lieut. Bass, a month in advance to select a station. After careful examination a station in a mountainous region 130 m. inland was chosen as affording the greatest probability of a cloudless sky. The event justified their expectations. Dr. Peters's party was the only one on the island that was completely successful, and obtained 237 photographs of the transit. During the transit Dr. Peters by means of the double-image micrometer measured the apparent diameter of Venus, thus determining for the first time the real size of the planet, with an error of probably not more than $\frac{1}{300}$ part of its value. M. Boquet de la Grye, chief of the French party, declared: "There is no need of other observations. Dr. Peters has accomplished all that was to be done." Dr. Peters is noted for his investigations in regard to comets and asteroids, having discovered 22 of the latter during the years 1861–'75, and determined their elements. **II. Wilhelm Karl Hartwig,** a German naturalist, brother of the preceding, born at Coldenbüttel, April 22, 1815. He studied in Copenhagen and Berlin, and became known by his exploration (1842–'7), under the auspices of the Prussian government, of Mozambique, which he described in his *Naturwissenschaftliche Reise nach Mossambique* (4 vols., Berlin, 1852–'68), from which Bleek compiled his "Languages of Mozambique" (London, 1856). He has been connected for many years with the medical department of the university of Berlin, and succeeded Lichtenstein in 1857 as professor of zoölogy and director of the zoölogical collections.

PETERS, or **Peter, Hugh,** an English dissenting clergyman, born at Fowey, Cornwall, in 1599, executed in London, Oct. 16, 1660. He graduated at Trinity college, Cambridge, in 1622, took holy orders, and preached for some time with great success at the church of St. Sepulchre in London; but having been committed to prison by Archbishop Laud for nonconformity, he removed on obtaining his release to Rotterdam, and in 1635 went to New England. On Dec. 21, 1636, he became pastor of the church in Salem, succeeding Roger Williams, whose doctrines he disclaimed and whose adherents he excommunicated. He took an active part in mercantile and civil affairs, suggested coasting and foreign voyages and the plan of the fisheries, and aided in reforming the town police. In March, 1638, he was appointed by the general court to assist in collecting and revising the colonial laws. In 1641 he was sent to England to procure an alteration in the laws of excise and trade. He joined the parliamentary party, became a preacher in the army, and in 1649 accompanied it to Ireland. In 1651 he was appointed by parliament one of the commissioners to amend the laws, and in 1654 he was made one of the "tryers" of ministers. After the restoration he was committed to the tower and indicted for high treason as having been concerned in the death of the king. It was also alleged that he was one of the masked persons who stood upon the scaffold when Charles was beheaded. During his imprisonment he wrote several letters to his daughter, published as "A Dying Father's Last Legacy to an Only Child" (1717). His other published works consist of sermons and political treatises and "Good Work for a Good Magistrate" (1651). His preaching was rendered very popular among the multitude by the use of coarse but striking images. His private character has been the subject of much discussion. According to Dr. Palfrey, his name should be written Peter.

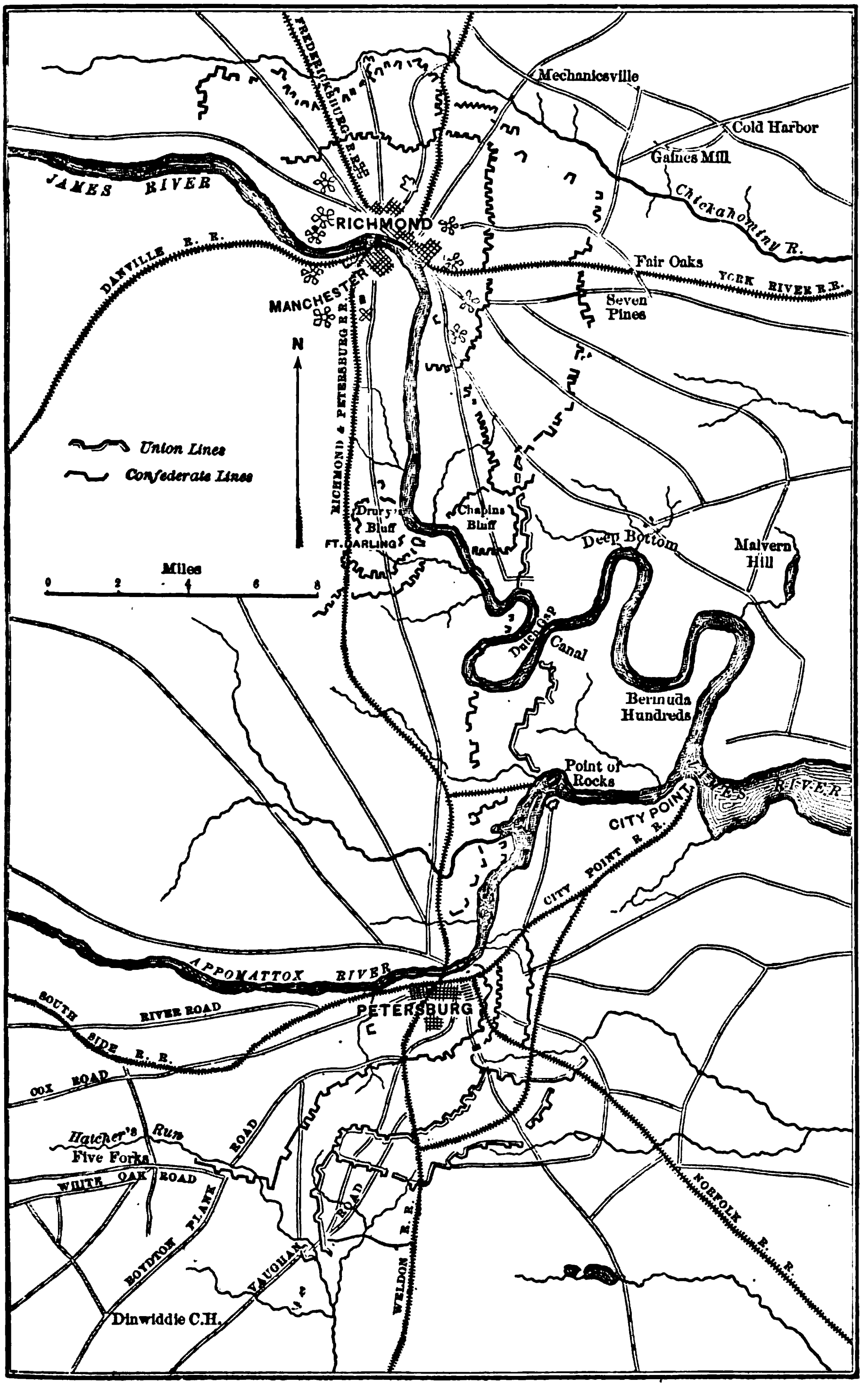
PETERS, John Charles, an American physician, born in New York, July 6, 1819. He studied in the medical department of Columbia college, and at Leipsic, Berlin, and Vienna, and began practice in New York as a homœopathist, but finally became an allopathist. He holds that the homœopathic law, *Similia similibus curantur*, is not universally true, but is a complement of the general law of medical treatment, *Alterantia alterantiis curantur;* that similar things differ as well as resemble, and as a medicine which acts similarly to a disease necessarily acts somewhat differently from it, it follows that homœopathic remedies exert an alterative action. Hence homœopathy and antipathy are not in reality opposing systems, but are parts of the great law of specific alterative or specific allopathic treatment. Among the suggestions made by him which have been adopted are the employment of alcohol in the treatment of consumption; the use of phosphates in medicine; the curative treatment of Bright's disease of the kidneys with corrosive sublimate; and the use of bromine and bromide of potassium as specific remedies in true membranous croup. He was one of the founders of the New York pathological society, and in 1859 was elected president of the proposed American college of medical sciences; and he has been president of the "Medical Library and Journal Association" of New York. He has published treatises on "Diseases of the Head" (8vo, New York, 1853); "Diseases of Females" (8vo, 1854); "Diseases of the Eyes" (8vo, 1855); "Treatment of Asiatic Cholera" (12mo, 1867); and "Principles and Practice of Medicine," published in numbers, and which is to form 2 vols. 8vo. In conjunction with Dr. Wotherspoon he translated Rokitansky's "Pathological Anatomy" (8vo, 1849); and in conjunction with Dr. F. G. Snelling and others he has published a "Materia Medica" (8vo, 1856–'60). He has been editor of the "North American Journal of Homœopathy" and of the "Transactions of the Pathological Society."

PETERS, Richard, an American jurist, born at Blockley, near Philadelphia, Aug. 22, 1744, died there, Aug. 21, 1828. He was educated for the law, but at the breaking out of the revolution became captain of a company of volunteers, and in June, 1776, was appointed by congress secretary of the board of war. On resigning this post in 1781 he was elected to congress, and after the organization of the government he became judge of the United States district court for Pennsylvania, a post which he retained for the rest of his life. The admiralty law of the United States may be said to owe to him its foundation.—His son Richard succeeded Mr. Wheaton as reporter of the United States supreme court, and published "Reports of the United States Circuit Court, Third Circuit, 1803–'18" (17 vols. 8vo); "Condensed Reports of Cases in the United States Supreme Court, to 1827" (6 vols. 8vo, 1835); "Digest of Cases in the United States Supreme Court and District Courts to 1847" (2 vols., 1848); and "Case of the Cherokee Nation against the State of Georgia" (1831). He edited "Chitty on Bills" (1819), and "Washington's Circuit Court Reports, Third Circuit, 1803–'27" (4 vols., 1826–'9).

PETERS, Samuel Andrew, an American clergyman, born in Hebron, Conn., Dec. 12, 1735, died in New York, April 19, 1826. He graduated at Yale college in 1757, became in 1760 a clergyman of the church of England, and in 1762 took charge of the churches of Hartford and Hebron. Being a tory, he was forced in 1774 to flee to England, where he revenged himself on the Puritans by publishing in 1781 "A General History of Connecticut," which has been called the "most unscrupulous and malicious of lying narratives." In 1794 he was chosen bishop of Vermont, but he was never consecrated. In 1805 he returned to America, and in 1807 published in New York a "History of the Rev. Hugh Peters," his great-uncle. In 1817 he made a journey to the falls of St. Anthony, claiming a large tract of land in that region. He afterward lived in New York in poverty and obscurity, though he obtained a pension and a grant for confiscated property. He is the "Parson Peter" of Trumbull's "McFingal."

PETERSBURG, a city and port of entry of Dinwiddie co., Virginia, on the S. bank of the Appomattox river, 12 m. above its entrance into the James at City Point, and 23 m. S. of Richmond; pop. in 1850, 14,010; in 1860, 18,266; in 1870, 18,950, of whom 10,185 were colored. It is lighted with gas, and abundantly supplied with water from a reservoir. It is well built and naturally drained, the ground descending gradually from the heights on the southern outskirts to the river. There is a public park, called Poplar Lawn. The principal public buildings are the custom house and post office, court house, two market houses, and theatre. The river is navigable to this place, which is at the head of tide water, and, it having been dredged and improved, vessels of large size now ascend to the wharves in the city. Immediately above the city the falls afford extensive water power. Above the falls the Appomattox is made navigable for bateaux to Farmville, 107 m. The Atlantic, Mississippi, and Ohio (with a branch to City Point), the Petersburg, and the Richmond and Petersburg railroads connect the city with the principal points of the state, and furnish a continuous line to Mobile, Ala., and also to Memphis, Tenn. The handling of cotton and tobacco, with wheat, corn, and general country produce, is the chief business. The foreign commerce, except in tobacco and cotton, is inconsiderable. There are ten tobacco factories, four cotton factories, four flour and grist mills, a whiskey distillery, four banks, two hotels, six schools of a high grade, one weekly (agricultural) and three daily newspapers, and 24 churches and chapels, viz.: 6 Baptist (4 colored), 4 Episcopal (1 colored), 1 Jewish, 9 Methodist (1 colored), 3 Presbyterian, and 1 Roman Catholic.—Petersburg was incorporated in 1748. It was twice occupied by the British under Gen. Phillips during the revolutionary war. The Petersburg volunteers served with distinction on the Canada frontier during the war of 1812.

PETERSBURG, Siege of, a series of operations in the last ten months of the civil war in the United States. After the second battle of Cold Harbor (see Chickahominy) Grant crossed the James, June 14, 1864, and took up his position at City Point, at the junction of the Appomattox and the James. Butler, in command of the army of the James, had already established himself close by, to the right, on the peninsula of Bermuda Hundreds. Lee at almost the same time crossed the Chickahominy, and took up a position which covered Richmond from attack on the N. and E. sides of the James. Including the force which he found there, Lee had about 70,000 men, while Grant had about 100,000. The first serious attempt to seize Petersburg was made unsuccessfully on June 15, by the corps of W. F. Smith of the army of the James. Grant directed another attack to be made, on the afternoon of the 16th, by the three corps of Smith, Hancock, and Burnside. The result of a series of engagements which cost the federals 10,268 men (1,198 killed, 6,853 wounded, and 2,217 missing), as stated by Grant, was that "the enemy was merely forced into an interior position, ... and the army proceeded to envelop Petersburg." Lee, leaving not quite half his force near Richmond, took the remainder to Petersburg; and his lines gradually grew in extent and strength, encircling the city on the east, south, and southwest. The actual siege began on June 19. Grant's first effort (June 21) was to seize the Weldon railroad. This attempt was committed to the corps of Wright and that of Hancock, now temporarily commanded by Birney. The effort was abandoned after a loss of about 3,000 men. Simultaneously with this attempt, Wilson with about 8,000 cavalry tore up the Weldon, South Side, and Danville railroads for many miles, so that the confederate army was reduced to sore straits for lack of supplies. Late in July a part of the Union army had crossed the James and intrenched itself at Deep Bottom, where it directly threatened Richmond. Grant hoped to induce Lee to send thither a part of his force at Petersburg. That accomplished, an attack upon the latter place was to be commenced by the explosion of a mine which had been dug by Burnside's direction. This mine, extending under a fort which occupied a salient position in the confederate lines, consisted of a gallery 520 ft. long, terminating in lateral branches 40 ft. in either direction. Directly behind this fort was Cemetery hill, which completely commanded Petersburg. Grant ordered the mine to be charged with 8,000 lbs. of powder, and if the confederate works should be destroyed by the explosion, Burnside was to be followed up by other corps. The mine was exploded about daybreak of July 30. The fort was blown up, carrying with it its garrison, a South Carolina regiment of a few hundred men, leaving a crater 200 ft. long, 60 ft. wide, and 30 ft. deep. The confederates fled from their works on either hand. The sides of the crater were so rough and steep that it was impossible to mount them in military order; a single Union regiment climbed up and made for Cemetery hill; but not being followed by others, they fell back into the crater. The confederates began to pour in shell, and planted guns so as to command the approach. After four hours of ineffectual effort the Union forces were withdrawn, leaving 1,900 men prisoners to the confederates. The entire Union loss in this attempt was about 4,000; the confederate loss appears not to have reached 1,000. Months of indecisive operations now ensued, Lee steadily foiling Grant's attempts to get possession of the railroads on the south and southwest. Butler endeavored to cut at Dutch Gap a shorter approach to Richmond by water, but this led to no important result. Early in February, 1865, an unsuccessful attack was made upon the extreme confederate right by Warren's corps and that of Hancock, now commanded by Humphreys. The Union loss was 2,000, that of the confederates about half as many. At the opening of spring the confederacy was practically limited to the southern third of Virginia and the northern third of North Carolina. Here Lee and Johnston had barely 100,000 men against the armies of Grant, Sherman, and Schofield, and the ample reënforcements on which they could reckon. Lee resolved to abandon Petersburg and Richmond, and to unite with Johnston somewhere on the borders of Virginia and North Carolina, but waited for practicable roads and new depots of supplies. On March 24 Grant issued orders for a movement to be commenced on the 29th against the extreme confederate right. Lee planned an offensive operation which would facilitate his own withdrawal; this was to pierce the lines near the Union right. Early on March 25 squads of men announcing themselves as deserters approached the Union lines; this had now become common, and no suspicions were aroused. These squads suddenly dashed upon the Union pickets and overpowered them. Then the confederate abatis were thrown down, and a column of 5,000 rushed out and seized Fort Steadman and some works on either side. The Union batteries from all sides began to play upon the fort, which was speedily retaken, and of the 5,000 confederates hardly 2,000 regained their lines. The entire confederate loss this day was about 4,500, that of the federals 2,084, nearly half of whom were prisoners. In pursuance of the order of the 24th, Sheridan with his cavalry moved by a wide detour toward the extreme confederate right. The infantry movement began on the morning of the 29th. Including Sheridan's 10,000 cavalry, the moving force was about 50,000. Stripping his intrenchments so that he left barely 10,000 men to hold lines ten miles long, Lee collected 15,000 or 20,000 men to oppose the enemy. They did not move until nightfall, but during the night a furious storm set in which lasted all the next day, making the roads almost impassable. Sheridan and Warren, however, worked their way a little onward, both heading toward the Five Forks, where the confederates had some slight works isolated from the main line. The confederates reached the Five Forks on the morning of the 31st, partly by the White Oak road, which they tried to hold. But Warren had already worked his way up to this road, and a severe struggle here ensued. After some apparent success the confederates suddenly fell back and disappeared, hastening to face Sheridan, who had pushed a part of his cavalry up to the Five Forks, from which he drove the enemy. Lee moved down the road, regained the Forks, and drove Sheridan back to Dinwiddie Court House, where a stand was made. Early on the morning of April 1 Warren had concentrated his corps within three miles of the Forks. Sheridan, who took command of both cavalry and infantry, completed his arrangements late in the afternoon, and two hours before sunset Warren moved upon the Forks, and forced the enemy into their works and then out of them. They made an ineffectual stand about a mile distant,


FREDERICKSBURG R.R.
Mechanicsville
Cold Harbor
Gaines Mill
Chickahominy R.
JAMES RIVER
RICHMOND
DANVILLE R.R.
Fair Oaks
YORK RIVER R.R.
Seven Pines
MANCHESTER
RICHMOND & PETERSBURG R.R.
N
Union Lines
Confederate Lines
Drury's Bluff
Chapins Bluff
FT. DARLING
Deep Bottom
Malvern Hill
Miles
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2
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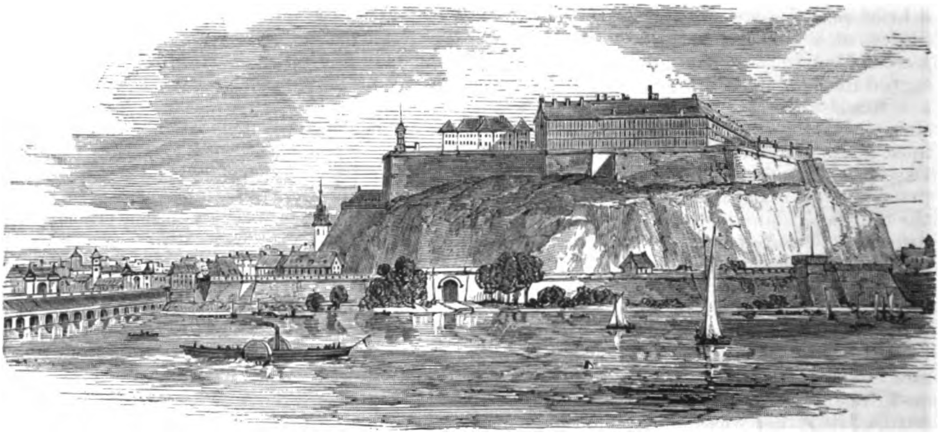
8
Dutch Gap
Canal
Bermuda Hundreds
Point of Rocks
JAMES RIVER
CITY POINT
CITY POINT R.R.
APPOMATTOX RIVER
SOUTH SIDE R.R.
RIVER ROAD
PETERSBURG
COX ROAD
Hatcher's Run
Five Forks
WHITE OAK ROAD
BOYDTON PLANK ROAD
VAUGHAN ROAD
WELDON R.R.
NORFOLK R.R.
Dinwiddie C.H.

but were routed and fled in confusion, pursued for miles by Sheridan's cavalry, who had also borne an important part in the action. The two strong divisions upon which Lee had mainly counted for the salvation of his army were annihilated. The Union loss was about 1,000. The confederate loss in killed and wounded is unknown, but they lost 5,000 or 6,000 prisoners. To prevent Lee from falling with his whole force upon Sheridan's command, a heavy bombardment was opened upon Petersburg, and a general assault was made at daybreak. The principal resistance was met in one of a chain of strong forts in rear of the lines, in which was a garrison of not more than 250 men. The fort was captured with a loss of 500 men; of the defenders only about 30 escaped. Lee concentrated the remnant of his army, and telegraphed to Richmond that he should abandon Petersburg and the capital that night. He still had about 40,000 men, but they were widely scattered. At 2 o'clock of the morning of April 3 the confederate pickets were still out; but the retreat was begun some hours before, and by 3 o'clock the confederate troops were all safely across the Appomattox, burning the bridge behind them, and blowing up the magazines on the whole line to Richmond. Parke's corps advanced, and were met by the mayor, who formally surrendered the city. At half past 4 the Union flag was raised over the court house. To unite their forces Lee marched N. W. from Petersburg, and Longstreet S. W. from Richmond, coming together at Chesterfield Court House. They then moved westward. Grant pursued by roads parallel to theirs, hoping to intercept them before they should reach Burkesville, at the crossing of the Danville and South Side railroads, 52 m. W. of Petersburg. Lee had ordered a provision train to meet him at Amelia Court House, but when it reached the place it was met by orders to proceed to Richmond to bring off the persons and archives of the government. The train went on without unloading, so that when Lee arrived he found no rations for his famishing troops, and he had to halt and break up his army into foraging squads. This unexpected delay proved fatal, and resulted in the surrender at Appomattox Court House, April 9.

PETER'S PENCE, an annual tribute of one penny formerly paid to the pope on the festival of St. Peter. In England, where every family possessed of 30 pennyworth of property of any kind was considered liable to this tribute, it was continued from Saxon times to the reign of Henry VIII. The tribute was collected by the bishops. The term is also applied to any general voluntary collection made for the pope, such as that in 1860; on Jan. 1, 1861, the amount received at Rome from this collection had exceeded $2,000,000. Since the annexation of the Papal States to the kingdom of Italy, voluntary Peter's pence associations have been formed in Great Britain and Ireland, which yield a handsome revenue. Similar associations, under various names, also exist on the continent of Europe and in the British colonies. In the United States a collection is taken up annually in every church and sent to Rome. These offerings now form (1875) the only revenue of the papal court.

PETERWARDEIN (Hung. *Pétervárad*), a fortress of the Austro-Hungarian monarchy, called "the Hungarian Gibraltar," in the Slavonian portion of the former Military Frontier, on the right bank of the Danube, 170 m. S. S. E. of Pesth, and 42 m. N. W. of Belgrade; pop. in 1870, 4,022, exclusive of the garrison. The upper fortress is on a lofty escarped rock overhanging a sharp promontory formed by a bend of the river, opposite the town and steamboat station of Neusatz in the Hungarian county of Bács, contains extensive barracks and arsenals for a large force, and presents to the water and land sides a formidable face of walls, port holes, and bastions.



Fortress of Peterwardein.

At the foot of the rock is the lower fortress, which contains the town proper. The two fortresses hold 10,000 soldiers. Under the Romans it was known as Acumincum. The present name is derived from Peter the Hermit, who is said to have marshalled here his followers in the first crusade. Prince Eugene achieved at Peterwardein a decisive victory over the Turks, Aug. 5, 1716. The Hungarians held out bravely here in 1848–'9 until after the surrender of Görgey and of Arad.

PETHERICK, John, a British traveller in Africa. In 1845 he went to Egypt, entered the service of Mehemet Ali as mining engineer, and in January, 1847, was sent to Kordofan. He spent several years in the region of the upper Nile, but on the death of Mehemet Ali he resigned his employment and became a merchant at Khartoom, where he was made British consul. In 1859 he went to England, and published "Egypt, the Soudan, and Central Africa, with Explorations from Khartoom on the White Nile to the Regions of the Equator" (London, 1861).

PETIGRU, James Louis, an American lawyer, born in Abbeville district, S. C., about 1789, died in Charleston, S. C., March 9, 1863. He graduated at the South Carolina college in 1809, a few years later was admitted to the bar, and practised in the rural districts, and subsequently in Charleston. From 1822 to 1830 he was attorney general of the state. During the nullification troubles of 1830–'32 he was one of the leaders of the "union and state rights" party, and on the defeat of his party, from having been one of the most popular men in the state, he became very unpopular. He nevertheless held the respect of the community, and maintained his position as a leader at the bar. Subsequently he was for a brief period district attorney of the United States, at a time when such a position subjected him to public odium. Still later he served in the state legislature, and in 1861 was a commissioner for codifying the laws and statutes of South Carolina. He opposed almost alone the secession movement in South Carolina in 1860, and adhered to his union principles till his death. He was president of the South Carolina historical society, and published a "Semi-Centennial Oration" delivered at the South Carolina college (1855), and an "Address before the South Carolina Historical Society" (1858). His biography has been written by W. J. Grayson (12mo, 1866).

PÉTION (ANNE ALEXANDRE SABÈS), first president of the republic of Hayti, born in Port-au-Prince, April 2, 1770, died there, March 29, 1818. His father was Pascal Sabès, a wealthy colonist, and his mother a free mulatto. He studied at the military academy of Paris, served in the French and afterward in the Haytian army, and when the revolution broke out in his native island rendered valuable service to Toussaint and Dessalines as an engineer, and was rapidly advanced. He did much to protect the colonists in that time of terror. When Toussaint began his proscription of the whites and mulattoes, Pétion took up arms to resist him, and maintained the conflict, with very unequal forces, until compelled to seek refuge in France. He returned from exile as a colonel in the army sent under Gen. Leclerc to subject Hayti anew to her former masters; but the retaliatory cruelties committed by that commander, and the reëstablishment of slavery, gave the signal for revolt (1802). Pétion placed himself under the orders of Dessalines, and they once more proclaimed the independence of Hayti (1804). Having succeeded Gen. Clervaux in the government of Port-au-Prince and the command of the mulattoes, Pétion held that post at the time of the assassination of the negro emperor (October, 1806). In the dissolution of the government which ensued, the mulattoes rallied round Pétion, whom they preferred, as one of their own caste, to Christophe, the leader of the blacks. Pétion was elected in 1807 president of the southern and western parts of the island; an office which was afterward conferred upon him in perpetuity, with the right of nominating his successor. Christophe believing himself entitled to undivided authority, the rivals took up arms, and for several years carried on a war in which the advantage seems to have been on the side of Christophe, who on one occasion defeated Pétion in a pitched battle, and pursued him to Port-au-Prince. At length the chieftains agreed, without entering into any formal treaty, to suspend hostilities, and leave each other undisturbed. A strip of waste country, 10 m. wide, was made the neutral boundary. Pétion now applied himself zealously to the improvement of his subjects. With absolute power he preserved the utmost republican simplicity. Property was equitably divided, without respect to distinctions of color; great attention was paid to public instruction; and the general forms of administration were copied from French models. But an insurmountable barrier was the character of the recently emancipated blacks who formed the majority of his subjects. The finances of the country fell into irretrievable disorder; onerous imposts upon commerce were resorted to, and the government was compelled to debase the coinage. The army was a mere rabble. Pétion fell into a state of hypochondria, refused all medicines and nourishment, and, after designating Gen. Boyer as his successor, died of mere inanition and despondency. His body now rests in the cemetery of Père Lachaise, Paris.

PÉTION (or **Péthion**) **DE VILLENEUVE, Jérôme,** a French revolutionist, born in Chartres in 1753, died near St. Émilion, Gironde, in June, 1794. He was a lawyer at Chartres, and in 1789 was elected deputy to the states general. In 1790 he was chosen president of the assembly. He was a bitter enemy of the court and of Mirabeau, and was one of the three commissioners who after the flight of the royal family, June, 1791, were sent to bring them back, treating them very roughly. Being elected mayor of Paris in preference to Lafayette, he secretly assisted in the popular manifestation of June 20, 1792, and was consequently suspended from his functions by the departmental directory, but was restored by order of the assembly, which had become alarmed by the popular cry of "Pétion or death!" He participated in the insurrection of Aug. 10, when he caused himself to be kept under guard by his own friends in order to be excused from any active proceedings to quell the troubles; neither did he interfere to stop the dreadful massacres of September. In the same year he was elected to the convention by the department of Eure-et-Loir, and nominated the first president of that assembly. He now leaned toward a milder policy, sided with the Girondists, and lost his popularity. He had insisted upon Louis XVI. being tried, and voted for his death, but on condition that an appeal might be made to the people. He was proscribed in conjunction with the Girondists (June, 1793), escaped from Paris, wandered for some months near Bordeaux, and finally was found dead, with Buzot, half devoured by wolves, both having probably committed suicide. The works of Pétion were published in Paris in 1793 (4 vols. 8vo); they consist merely of speeches and political tracts.

PETITION, Right of, the right of the citizen to petition to those in authority for a redress of grievances. In free countries this is usually regarded as a valuable right, and one to which every person is entitled by the constitution. It extends to all legislative and all discretionary executive action. To secure the full value of the right, it is necessary that great freedom be allowed in commenting upon persons and measures, and a petition is therefore regarded as a privileged document, and errors in its statements do not subject the signers to responsibility if they are made without actual malice. But this exemption would not be recognized if the petition were addressed to a person or body having no authority over the subject matter thereof. The right of petition is expressly secured to the citizen by constitutional provisions in the United States, and in legislative bodies the presentation of petitions and their reference to appropriate committees are usually entered on the journal. An exception was at one period made by congress of petitions on the subject of slavery, which were not accorded the courtesy of a reference.

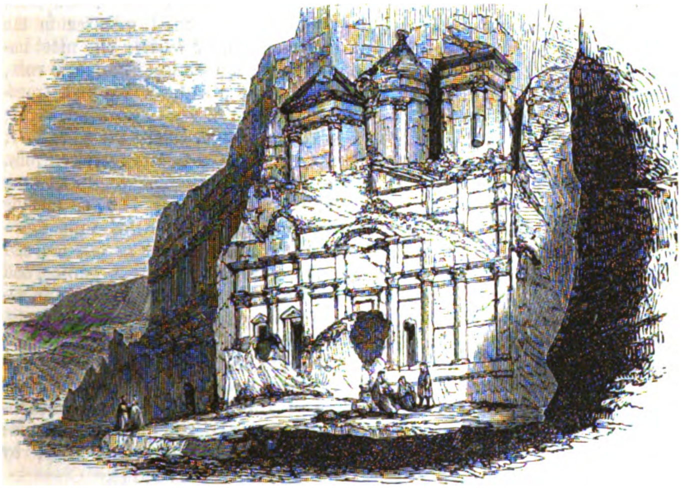
PETITOT, Louis Messidor Lebon, a French sculptor, born in Paris, June 23, 1794, died there, June 1, 1862. He studied under his father Pierre Petitot (1751-1840) and in the school of fine arts, where in 1814 he obtained the principal prize, entitling him to go to Rome, whence he returned in 1820. Among his principal works are "Ulysses visiting Alcinous" (1821), "St. John the Baptist" (1822), "A young Sportsman bitten by a Serpent" (1824), and "A Calabrese Pilgrim and his Son overwhelmed by fatigue imploring the aid of the Virgin" (1847), which was placed in 1874 in the garden of the Luxembourg.

PETIT-THOUARS. See Du Petit-Thouars.

PETO, Sir Samuel Morton, an English railway contractor, born at Woking, near London, Aug. 4, 1809. He became a master builder in 1830, and among the important edifices erected by his firm were the houses of parliament, which were continued by his partner Mr. Grissell after his withdrawal in 1845. Mr. Peto engaged very largely in railway construction, having been the contractor for many of the most important lines in England, Canada, and other countries. In 1855 he was made a baronet for having at his own expense built a railway from Balaklava to Sebastapol during the Crimean war. He represented Norwich in parliament from 1847 to 1855, Finsbury from 1859 to 1865, and Bristol till April, 1868, when he retired on account of the failure of his firm (Peto, Betts, and Crampton) with liabilities exceeding £7,000,000. He has published "Taxation, its Levy and Expenditure" (London, 1863), and "Resources and Prospects of America" (1866).

PETŐFI, Sándor, a Hungarian poet, born in Little Cumania, Jan. 1, 1823, disappeared July 31, 1849. He was the son of a tavern keeper, and after irregular studies at various schools became a strolling player; but he soon made himself known by his songs, and at the age of 24 was acknowledged the foremost lyric poet of his country. On March 15, 1848, he headed the movement in Pesth which formed the first scene in the Hungarian revolution of that year, and throughout the war his stirring songs greatly increased the patriotic enthusiasm. During the campaign in Transylvania he was aide-de-camp of Gen. Bem, and was last seen at Schäsburg among the scattered remnants of the army, pursued by Cossacks. There is little doubt that he perished; but for many years the popular belief in Hungary was that he still lived. His "Poems" have appeared in various editions, and selections from them have been translated into German, French, and English.—See Chassin, *Le poète de la révolution hongroise, Alexandre Petœfi* (1860).

PETRA, an ancient city of Edom, 50 m. S. of the Dead sea, on the mountain ridge E. of the wady el-Arabah, and a few miles E. of Mt. Hor. The entrance to the ruins through the *sik* or ravine of the wady Musa, a winding street a mile long, is lined on both sides with tombs hewn out of the rocky cliffs. At the opening of this avenue is the structure called the Khazneh (the treasure), from a tradition that one of the Pharaohs enclosed money and jewels in an urn surmounting the façade. It consists of a square basement, adorned with a portico of four very beautiful Corinthian pillars, surmounted by a pediment of low Grecian pitch, and with an ornament on the apex resembling somewhat a lyre. At the ends of the façade are two pilasters which support a second pediment, the central block of which has a cylindrical form and bears the urn. This pediment, being divided into three portions, presents nine faces of rocks. The edifice has generally been held to be a tomb or temple, but E. H. Palmer concludes from the female figures sculptured into the nine faces of the pediment, which he takes to represent the nine muses, that it was the *musæum* or philharmonic institution of Petra. There are several tombs which present very elegantly constructed fronts. One of them contains a number of graves or *loculi*, cut in the floor, and placed so as to make the most of the room; and the wall to the left of the entrance bears some rude representations of sepulchral monuments, with two Nabathean inscriptions underneath. Further on are some arched terraces of brick adjoining excavations below; and above them is a temple, also excavated, and with an elaborately carved front, which was at one time used as a Christian church. The tombs are so numerous that Fergusson has called it "the petrified city of the dead;" but it is probable that many of these excavations spoken of as tombs were temples, altars, and convents. Other interesting remains are the Deir, a huge temple hewn in the rock, and a theatre, likewise excavated, with 33 rows of seats, 120 ft. in diameter, and capable of accommodating from 3,000 to 4,000 spectators. The city is supposed to be the same as the Sela of the Old Testament, both names signifying rock.—For the ancient history of Petra, see EDOM, and HORITES. After its capture by the Mohammedans it disappears altogether from history, and it remained unvisited and forgotten, at least after the beginning of the 13th century, until its discovery by Burckhardt in 1812. It was visited by Irby, Mangles, Banks, and Leigh in 1818; subsequently by Laborde and Linant, Robinson, Stevens, and others; in 1864 by the duke de Luynes, with Lieut. Vignes and Lartet; and in 1870 by Prof. E. H. Palmer and Tyrwhitt Drake.—See Laborde and Linant, *Voyage de l'Arabie Pétrée* (Paris, 1830; English ed., London, 1838), and the works cited in the article EDOM.



Corinthian Tomb at Petra.

PETRARCH (It. PETRARCA or PETRARCHA), **Francesco**, an Italian poet, born in Arezzo, July 20, 1304, died at Arqua, near Padua, July 18, 1374. His father, Pietro or Petracco (whence the surname of the son), a notary at Florence, was exiled like Dante by the Neri; but his wife, a member of the distinguished Castegiani family, was allowed in the year following Petrarch's birth to return to the vicinity of Florence, whence in 1312 she went to Pisa, joined her husband at Avignon in 1313, and in 1315 moved to Carpentras, where Petrarch received the rudiments of education. Against his wishes he was made to study law at Montpellier (1319-'23) and Bologna (1323-'6), but devoted most of his time to the classics and poetry. During the latter period he lost both of his parents and most of his patrimony, and he and his brother subsequently qualified themselves for ecclesiastical preferments. His favorite authors were Cicero, Seneca, Livy, and Virgil; he assiduously collected and transcribed precious Latin manuscripts, and at a later period studied Greek, especially Plato. In 1327 (April 6) he first beheld Laura, the object of his lifelong admiration and love, at the church of St. Clara, Avignon. His friend Boccaccio regarded her as an imaginary being. Others denied, not her existence, but her being married. Nothing positive was known about her until the 18th century, when the abbé de Sade, a French biographer of Petrarch, identified her as the daughter of a Provençal nobleman, Audibert de Noves, the wife of Hugues de Sade, and the mother of numerous children, who died of the plague in her 40th year, April 6, 1348, the date given by Petrarch. De Sade's assertions, however, are not generally accepted, and the poet himself throws no light upon Laura's history. He pictures her as a lady of ideal beauty of person and mind, who cherished his homage without requiting his love. He in vain attempted to stifle his passion by the excitement of travels in France, Flanders, Germany, and Italy, and of public affairs, and by an illicit connection with another woman, who bore him several children.

Disgusted with Avignon, which he called the western Babylon, he fixed his abode in 1337 in the valley of Vaucluse. In 1340 both the senate of Rome and the university of Paris designated him as poet laureate, and after an examination by King Robert of Naples, he was crowned at the capitol in Rome, April 8, 1341. In 1342 he was sent by the Romans to Avignon, jointly with Rienzi, on a fruitless mission to induce Clement VI. to return to Rome. In 1343 the pope sent him on a mission to Naples. He next spent some time at the court of Parma, returning to Avignon in 1347, where he saw Laura for the last time. He set out for Italy with strong hopes of Rienzi's abiding success, but at Parma received the news of his overthrow (Dec. 15, 1347). He now alternately resided at Padua, where Jacopo Carrara procured him a canonry, and at Parma, where the pope made him an archdeacon, and visited many Italian cities. His Florentine citizenship and property were restored to him in 1351, and he was invited to assume the direction of the projected university, but declined to settle in Florence. At Venice he became acquainted with the doge Andrea Dandolo, and repeatedly attempted to restore peace between that republic and Genoa. He was once more at Vaucluse and Avignon in 1351–'2, and in 1353 began his connection with the Visconti in Milan, who sent him on diplomatic missions to Venice (1354), to Charles IV. of Germany at Prague (1356), and to Paris (1360). He resided in Venice and its vicinity from 1361 to 1370, when he proposed to visit the pope at Rome, but was taken ill at Ferrara and withdrew to the village of Arqua in company with his natural daughter and her husband, Francesco da Brossano. Despite his infirmities, he finished in the last year of his life a Latin translation of Boccaccio's story *Griseldis*, and sent it to the latter about ten days before his death. He was buried in the parish church of Arqua.—Petrarch's erudition was immense. His principal Latin works, *De Vera Sapientia*, *De Remediis utriusque Fortunæ*, *De Vita Solitaria*, and *De Contemptu Mundi*, combined Platonic ideas with the doctrines of Seneca, and were regarded as the first protest against the subtleties of the age and as the forerunners of modern philosophy. Among the many important manuscripts which he brought to light are Quintilian's "Institutes," Cicero's "Familiar Letters," and the "Epistles to Atticus." His *Africa*, an epic, and other Latin poems, though faulty in many respects, were superior to most preceding works of the kind. By promoting the revival of classical learning he rendered immortal service to the intellectual progress of mankind, and the Italian language is indebted to him for great improvements. He was equally illustrious as the opponent of ecclesiastical corruption and as the poetical and political champion of Italian unity. In Italian lyrical poetry he is without a rival. His principal work, *Il canzoniere*, or *Rime di Petrarca*, consists of more than 300 sonnets, about 50 canzoni or odes after the model of the troubadour songs (including three dedicated to the eyes of Laura, called by the Italians the three sister graces), and three short poems in *terza rima* (*Trionfo d'amore*, *Trionfo della morte*, and *Trionfo della fama*). His Latin writings appeared at Basel in 1496, and a more complete edition in 1581. A new and revised edition of his *De Rebus Familiaribus et Varia* has been published by Fracasetti (3 vols., Florence, 1859–'63). His Italian poetry, first printed at Venice in 1470, has passed through hundreds of editions, the best being by Marsand (2 vols., Padua, 1819–'20). Marsand collected a library of 900 volumes relating to Petrarch's life, a catalogue of which appeared at Milan in 1826; in 1829 it was purchased by Charles X. for the Louvre. A portion of his inedited writings was published by "A. H." in Trieste in 1874. Besides the early commentaries on Petrarch, many have been written in modern times, including those of Tassoni, Muratori, Biagioli, and Leopardi. Still greater is the number of biographies, of which the most important are those by De Sade (French, 3 vols., Amsterdam, 1764–'7; abridged English translation by Mrs. Dobson, 2 vols., London, 1775); Baldelli (Italian, Florence, 1797; 2d ed., 1837); Thomas Campbell, "Life of Petrarch" (2 vols., 1841); Alfred Mézières, *Pétrarque, étude après de nouveaux documents* (Paris, 1867); Ludwig Geiger, *Petrarka* (Leipsic, 1874), the most analytical of all; and a multiplicity of poetical and prose writings relating to his life, genius, and relations with Laura, published in 1874 in various places on the anniversary of his death. English translations of his Italian poetry have appeared from time to time in the present century, and a complete edition by various authors was published in 1860. The most recent specimen versions are contained in "The Sonnet: its Origin, Structure, and Place in Poetry," by Charles Tomlinson (London, 1874).

PETREL, the common name of the web-footed oceanic birds constituting the subfamily *procellarinæ*, characterized by tubular nostrils, placed on the basal portion of the culmen and opened in front; the beak as long as the head, straight, more or less compressed, grooved as if composed of several pieces, with the tip strong, arched, suddenly hooked, and acute. The best known genera are *procellaria* (Linn.), the petrels proper, and *thalassidroma* (Vigors), the stormy petrels. The general form of the body is like that of the gulls, but the feet have a very rudimentary hind toe, and the beak is very different, the apical being distinctly separated from the basal portion; the habits also are like those of the gulls, but more oceanic, as they pass most of their lives in skimming over the surface of the waves; they rarely visit the shore except for breeding, and then select rocky shores, depositing their eggs on the bare rock. They have a habit of running with closed wings upon the surface of the waves. The flight is rapid, powerful, and con-

Pintado Petrel (Procellaria Capensis).

tinuous, the same birds following vessels for many successive days; they sail along with extended wings, without flappings, and with apparently little motion; the higher the wind and the more agitated the sea, the more abundant are these birds, as at such times the crustaceans, mollusks, and other marine animals upon which they principally feed are most easily obtained.—In the genus *procellaria* the wings are long and pointed, the first quill the longest; the tail moderate and rounded, tarsi shorter than the middle toe, toes long and fully webbed and the lateral ones margined externally, the hind toe a mere triangular claw. The giant petrel (*P. gigantea*, Gmel.; genus *ossifraga*, Homb. and Jacq.) is about 3 ft. long and 7 ft. in alar extent, at a distance resembling a small albatross; the plumage is dense, full, and elastic, and the head is wholly feathered; the color above is brownish gray mottled with dusky white, the wings and tail dusky brown; lower parts white; bill, legs, and feet yellow. Common in the southern ocean, it is sometimes seen on the Pacific coast of North America as far up as Columbia river in spring and summer; it is very rapacious, attacking and tearing to pieces the smaller petrels and young gulls; it lays its eggs on the sandy shores of the Falkland islands, where it occurs in immense numbers; the young are fed with oily matters which the parents eject from the stomach for the purpose. Other species found on the American coast are the Pacific, slender-billed, fulmar, and tropical petrels, respectively the *P. pacifica*, *tenuirostris*, *glacialis*, and *meridionalis*, the first two found on the Pacific, and the last two on the Atlantic coast. (See Fulmar.) The pintado petrel, or Cape pigeon (*P. Capensis*, Linn.; genus *daption*, Steph.), is about 15 in. long; the general color is white above, varied with brown; the upper part of head and hind neck plumbeous black, smaller wing coverts the same, tipped with brown, the larger white margined with black; primaries white on the inner web and black on the outer; secondaries and tail white with dark tips; lower parts white; bill black. This species is abundant in the southern ocean, with the albatross and other petrels; it has been seen on the coast of California. More than 20 other species are described.—In the genus *thalassidroma* the bill is shorter and more slender and weak; the nostrils open by a single tubular aperture, as in the preceding genus; the second quill is the longest, the tail more or less forked, the legs long and slender, with an extensive bare space on the tibia, tarsi longer than the middle toe, and the hind toe a small claw. The species, about a dozen, are small, and inhabit the surface of the sea in both hemispheres, skimming lightly and irregularly over the waves, floating upon them, or running along the tops; they follow vessels for great distances, feeding upon the greasy matters thrown overboard and upon minute marine animals; they are dark-colored, more or less marked with white, and are popularly called Mother Carey's chickens and sometimes sea swallows. The common stormy petrel or Mother Carey's chicken (*T. pelagica*, Vig.) is about 5¾ in. long, with an alar extent of 13½ in.; the bill and feet are black; the color is grayish black above, tinged with brown; below sooty brown; secondary coverts margined with grayish white, and quills black; rump and upper tail coverts white with black shafts, the tail coverts broadly tipped with black. They are thought by sailors to forebode stormy weather, and are therefore dreaded and scrupulously unmolested; they occur in most parts of the temperate Atlantic, and are common about the banks of Newfoundland with the other species. They breed on rocky shores and islands in the N. Atlantic, on St. Kilda, and the Shetland islands; in the latter they begin to lay toward the end of June, depositing a single egg in a nest made of plants and earth, carefully concealed, sometimes at a

Stormy Petrel (Thalassidroma pelagica).

depth of 3 or 4 ft., under the stones on the beaches; they remain quiet by day, becoming active about twilight; the eggs are 1⅛ by ¾ in., white, with minute dull red dots at the larger end. According to Brünnich, this bird becomes so fat that the inhabitants of the Faroe islands string it to a wick, and use it as a lamp. Other species of this genus are found in America.—In the genus *pelecanoides* (Lacép.) the bill is shorter than the head, broad, depressed, and swelled at the sides; beneath the bill is a membranous pouch capable of extension; nostrils opening by two tubular apertures; wings very short, as are the tarsi and tail; toes long, the hind one wanting. A few species are described, inhabiting the coasts of New Zealand, Australia, and the extreme parts of South America; they are seen in troops, and dive very frequently, probably in search of small fish; they are rather poor fliers, compared with other petrels.—In the genus *prion* (Lacép.) the bill is longer, depressed, with nearly straight culmen, sides dilated near the base and beset posteriorly with fine parallel laminæ; nostrils with two openings, short and elevated; the hind toe a mere claw. The broad-billed petrel (*P. vittatus*, Lacép.), found between lat. 35° and 70° S., is bluish ash above, with tips of quills and wing coverts black; some of the characters of the bill resemble those of the fishing ducks. It is wild and solitary, a rapid flier, and constantly on the wing; the nests are made in society, in burrows about a yard deep, excavated in the sides of hills near the sea; the eggs are white, elongated, like those of a pigeon.—For the genus *puffinus* (Briss.) see SHEARWATER.

PETRIE, George, an Irish archæologist, born in Dublin in 1789, died Jan. 18, 1866. He studied painting in Dublin, and won a silver medal at the age of 14. He exhibited his first pictures at Somerset house, London, in 1816, and furnished many illustrations of Ireland for engravers. In 1832 he became associate editor of the "Dublin Penny Journal," and in 1842 editor of the "Irish Penny Journal," both illustrated. He was commissioned by the royal Irish academy to purchase rare manuscripts, and secured an autograph copy of the second part of the "Annals of the Four Masters," and in 1831 published "Remarks on the History and Authenticity of the Autograph Originals of the Annals of the Four Masters." In 1832 he received a prize of £50 and the gold medal of the academy for an essay on the round towers, enlarged and published under the title of "The Ecclesiastical Architecture of Ireland anterior to the Anglo-Norman Invasion" (Dublin, 1845). In 1836 he received the gold medal for his "Ancient Military Architecture of Ireland," and in 1837 the old medal for his "History and Antiquities of Tara Hill." He was the head of the historical and antiquarian department of the "Ordnance Memoir," designed to accompany the survey, and collected more than 400 volumes of letters and documents. The first volume was published in 1839, but the work was never completed. He took down from the peasant musicians and singers much old and unwritten music, and published it in 1855. He wrote "Picturesque Sketches in Ireland" and "Views in the North of Ireland," and contributed to the 18th volume of the transactions of the royal Irish academy an "Account of an Irish Reliquary called the Domnach Airgid" (1832), and "Remarks on the Book of MacFirbis" (1837). He was secretary and afterward president of the royal Irish academy, and received a pension of £300.—See "Life and Labors of George Petrie," by W. Stokes (1868).

PETRIFACTIONS. See PALÆONTOLOGY.

PETROBRUSSIANS. See BRUYS, PETER DE.

PETROLEUM (Lat. *petra*, a rock, and *oleum*, oil), rock oil, a natural product of certain geological formations, sometimes rising to the surface through natural channels, forming springs, but chiefly obtained by boring. It was known to the ancient Greeks and Romans, and by Pliny, Tacitus, Vitruvius, and other Roman writers was designated *bitumen*, a word derived from the Greek *πίττα*, *πίσσα*, pitch, and probably first written *pitumen*. Among the localities cited where the liquid bitumen was found is Zacynthus (now Zante), one of the Ionian islands. As it is referred to by Herodotus, this spring must have been flowing more than 2,000 years. At Agrigentum in Sicily the petroleum was collected and burned in lamps. (Dioscorides, i. 99.) It was but little noticed during the middle ages, excepting in certain localities where it occurs in large quantities; but in modern times it has become one of the most important of natural productions. It occurs in rocks or deposits of nearly all geological ages, from the lower Silurian to the tertiary epoch. It is associated most abundantly with argillaceous shales and sandstones, but is found also permeating limestones, giving them a bituminous odor; and from these it often exudes, floating upon the streams and lakes of the region, or rising in springs. It often exists in subterranean cavities, situated along gentle anticlinals in the barren rocks of the region, the oil having collected in them from the subjacent strata, and having been retained by the impervious overlying sandstones. If the oil existed already formed, a slight elevation of temperature or hydrostatic pressure would force it into these cavities or bring it to the surface; but if it was formed by destructive distillation from materials within the rocks, considerable heat would be necessary.—Petroleum is very widely distributed, yet there are a few localities especially noted for its occurrence, among which are the following: Amiano and other places in the north of Italy, which have furnished the supplies used for lighting the cities of Parma and Genoa; Baku on the borders of the Caspian; the slopes of the Caucasus; Rangoon in Burmah; the island of Trinidad; and portions of the province of Ontario, Pennsylvania, Ohio, New York, West Virginia, and

California. In northern Italy, in the former duchies of Parma and Modena, petroleum has been extracted from the earth since its first discovery in 1640, the method pursued being merely to sink pits, and collect the fluid that exuded from the soil in little basins or reservoirs at the bottom. Various sorts were gathered from different localities, and their peculiar properties appear to have been correctly observed; but no methods of purifying them were employed; on the contrary, the lighter and better oils were made the medium of utilizing the poorer sorts by mixture. The W. shore of the Caspian (see Baku) has been celebrated from a remote period for the extraordinary quantities of inflammable gases and liquids that rise from the surface of the ground. They are met with over a tract of country about 25 m. long and about ½ m. wide, in strata of a porous argillaceous sandstone belonging to the tertiary period. In the vicinity are hills of volcanic rocks through which flow out springs of the heavier sorts of petroleum. The oil is collected by means of large open wells 16 to 20 ft. in depth. It is introduced very largely into Persia, and over large districts no other material is used for artificial light. During the past few years the attention of the Russian government has been directed to this possible source of mineral wealth in this region and the neighboring slopes of the Caucasus. An accomplished engineer was sent to the United States to investigate our methods of operation, and on his return numerous wells were bored in the vicinity of the city of Tiflis, which have proved remarkably productive, even rivalling those of Pennsylvania. The Rangoon district on the Irrawaddy is quite as wonderful for its immense production of rock oil as Baku. For an unknown period the whole Burman empire and a considerable portion of India have been supplied with oil from this source. The trade is carried on by means of large boats that come up the Irrawaddy to the town of Rainanghoung, a place inhabited by potters, who are constantly making the earthen jars in which the oil is kept. These are piled up in great pyramids about the town, ready for use. The wells are in beds of sandy clays which rest on sandstones and argillaceous slates, and are sometimes sunk to the depth of 60 ft. Under the slates is said to be coal; but this and the other strata may be of the tertiary epoch. Symes ("Embassy to Ava," vol. ii.) says the number of wells in this district exceeded 520, and the annual yield of petroleum was more than 400,000 hogsheads. The natives use the oil in lamps, for preserving timber against insects, and as a medicine. Petroleum is found at several places in upper Burmah. In 1873 about 150 wells were worked at Yeynaugyoung, and about 50 at Pagau. The oil of the latter closely resembles naphtha. The annual production in this region is about 65,000 bbls.—The occurrence of petroleum about the head waters of the Alleghany river in New York and Pennsylvania was known to the early settlers. The Indians collected it on the shores of Seneca lake, and it was sold as a medicine by the name of Seneca or Genesee oil. A stream in Allegany co., N. Y., was named Oil creek in consequence of the appearance of oil in its banks; and the same name was given to another branch of the Alleghany river in Venango co., Pa. At points along the latter springs issued from the banks of the stream, bringing up oil, which collected on the surface of the water as it stood in the pools below the springs. The inhabitants were accustomed to collect the oil by spreading woollen cloths upon the water, and wringing them when saturated. Down the valley of this creek are numerous ancient pits which appear to have been excavated for collecting oil, but by whom no one can now tell. From the fact that logs have been found in them notched as if with an axe, some have supposed that the work was done by the French, who occupied this region in the early part of the last century; others believe that the Indians, who are known to have valued the oil, dug the pits. Day, in his "History of Pennsylvania" (1844), gives an account of the estimation in which they held this product, using it mixed with paint to anoint themselves for war, and also employing it in their religious rites. He quotes an interesting letter from the commander of Fort Duquesne to Gen. Montcalm, describing an assembly of the Indians by night on the banks of the creek, and in the midst of the ceremonies their firing the scum of oil that had collected upon the surface of the water. As the flames burst forth, illuminating the dark valley, triumphant shouts rose from the Indians. The quantities of oil collected by the early settlers were unimportant, the largest amount, which was from the lower spring on Oil creek, reaching sometimes 20 barrels in a year. When, in boring for salt near Tarentum, 35 m. above Pittsburgh on the Alleghany river, springs of petroleum were struck in 1845, the material was valued only as a medicine, and for this use it was long retailed in small quantities at high prices. In Ohio, on the Little Muskingum, the inhabitants narrowly missed learning the importance of this product as far back as the year 1819. Dr. S. P. Hildreth of Marietta, in the "American Journal of Science" (1826), speaking of the borings for salt water, says: "They have sunk two wells, which are now more than 400 ft. in depth; one of them affords a very strong and pure water, but not in great quantity. The other discharges such vast quantities of petroleum, or as it is vulgarly called 'Seneka oil,' and besides is subject to such tremendous explosions of gas as to force out all the water and afford nothing but gas for several days, that they make but little or no salt. Nevertheless the petroleum affords considerable profit, and is beginning to be in demand for lamps in workshops and manufactories. It affords a clear, brisk light, when burnt in this way, and will be a valuable article for lighting the street lamps in the future cities of Ohio." It is not a little singular that, with the sources of supply thus pointed out and the useful application of the petroleum understood, its value should have remained unappreciated, and at the expiration of more than 35 years be at last perceived through the progress of experiments made upon the distillation of bituminous shales and coal. The success attending these, and the similarity of the crude oil to the natural petroleum, caused attention to be directed to the sources of this with the view of testing the capacity of the supplies, and applying to the natural oil the methods of purification invented for the artificial. The first movement made in this direction was in 1854, by Messrs. Eveleth and Bissell of New York, who secured the right to the upper spring on Oil creek, and organized a company in New York. The quality of the oil was tested and a report made upon it by Prof. B. Silliman, jr. No progress was made in establishing the business until December, 1857, when Messrs. Bowditch and Drake of New Haven undertook to search for the oil. Col. E. L. Drake removed to Titusville on Oil creek, and in the winter of 1858–'9 completed his arrangements for boring into the rock below the bed of the creek. The work advanced very slowly, and it was not until Aug. 26, 1859, that oil was struck at the depth of 71 ft. The drill suddenly sank into a cavity in the rock, and the oil rose within 5 in. of the surface. A small pump being introduced, a supply of oil was obtained, amounting to 400 gallons a day; and with a larger pump the flow was increased to 1,000 gallons a day. Though a steam engine was applied to the work and kept in constant operation, the supply continued uninterrupted for weeks. This success gave a new value to every spot where oil had ever been found or which was thought likely to produce it. The narrow valleys of the watercourses, excavated 300 or 400 ft. through the piles of horizontal strata, had been its natural outlets, and along these great numbers of wells were soon commenced. Oil creek below Titusville, the valley of the Alleghany from below Franklin up into Warren co., and the banks of French creek, were soon explored by wells, and around the most successful of these villages rapidly sprung up, and extraordinary business activity was introduced into regions that had been among the most retired and quiet portions of the state. Next to Oil creek the valley of the Alleghany, from Tidioute in Warren co. S. to the Venango line, contained the most productive wells, and others of great yield were opened in the town of Franklin. So numerous were these undertakings, that the village presented a curious aspect with the numbers of tall derricks, employed in boring the artesian wells, scattered among the gardens and house lots. Before the close of the year 1860, according to one published statement, the number of wells had amounted to full 2,000, and 74 of these were producing daily 1,165 barrels of 40 gallons each. In Allegany co., N. Y., about a mile N. W. of the town of Cuba, operations were begun about the first of January, 1861, near a famous great pool, which had always been known as the oil spring. Before the iron pipe driven into the ground had reached the rock, oil mixed with water gushed violently up through it. On the margin of the coal field in Trumbull co., Ohio, at a place called Mecca, 44 m. from Cleveland and 60 from Erie, Pa., wells were first sunk in the spring of 1860, the encouragement for making the trial consisting in the fact of the water in the wells being strongly impregnated with oil. In West Virginia wells have been successful in Ritchie and Wirt cos. In 1840 a spouting well of oil at Burkesville, Ky., was described, and in 1844 Mr. Murray mentioned the petroleum of Enniskillen, Canada.—Various opinions have been expressed concerning the origin of petroleum. Until quite recently, all of these theories were based upon the assumption that it has been derived from vegetable or animal organisms. Some have supposed that it is the product of the decomposition of woody fibre, by which more of the carbon and less of the hydrogen has been evolved than by the decomposition which has produced coal. Again, it has been supposed to be the product of the natural distillation of pyrobituminous shales and coals. Lesquereux attributes its origin to the partial decomposition of low forms of marine vegetation. Berthelot has advanced the theory that by complex chemical changes at present taking place in the interior of the earth, petroleum is being continually set free. It may be assumed that petroleum is the normal or primary product of the decomposition of marine animal or vegetable organisms, chiefly the former, and that nearly all other varieties of bitumen are products of a subsequent decomposition of petroleum, differing both in kind and degree. The occurrence of petroleum in the lower palæozoic rocks of Pennsylvania and Canada, which contain no traces of land plants, shows that it has not in all cases been derived from terrestrial vegetation, but may have been formed from marine plants or animals; an opinion further strengthened when we find in rocks of tertiary age, in which fossil remains of the higher marine animals occur in abundance, a petroleum comparatively rich in nitrogen. Such is the character of the petroleum issuing from the miocene of the coast ranges of southern California. In Trinidad a thick oil (maltha), with asphalt, occurs with lignite, and specimens of the vegetable material are found partly changed to oil and penetrated by it, and having its cells looking as if it had been corroded by it. Though we obtain oils resembling petroleum by the destructive distillation of coals, shales, and even animal substances, its occurrence is not confined to localities contiguous to large deposits of these substances. On the contrary, springs of it issue in different parts of the world from all the stratified rocks, and from the volcanic and metamorphic formations. In Ohio and West Virginia it is found in the coal measures, and the wells are in some instances sunk through these into the sandstones and slates before they become productive. In N. W. Pennsylvania or in New York the wells are entirely outside of the coal field, and so remote from it that we cannot well imagine any connection between the oil and the coal beds. The strata in which the oil is found dip S. and pass below the coal measures at least 500 or 600 ft., the nearest coal bed to the more northern springs occurring in the tops of the highest hills, perhaps 30 m. distant. The conglomerate which underlies the coal formation caps some of the hills in the oil region, and attains a thickness of from 100 to 300 ft. The shales and sandstones that succeed below this rock belong to the Chemung and Portage groups of the New York geologists, and extend over a large portion of southern New York, west of Binghamton, and of northwestern Pennsylvania. The oil wells are bored in this group through alternating layers of shales and sandstones, and an occasional stratum of a bluish sandy limestone. The next group below is that known as the Hamilton shales in New York, and in Ohio as the black slate. Prof. Newberry considers this the source which affords the petroleum. It contains much carbonaceous matter, and is supposed by him to be amply sufficient for generating the supplies that are forced upward from it by the water that finds its way beneath the oil, and by the pressure of the carburetted hydrogen gas also furnished from the same source. It is from these slates that the oil springs of Ontario issue, and these are far distant from the coal formation. In southern California the oil issues from shales interstratified with coarse sandstones of enormous thickness, and nowhere containing coal. In the northern part of that state it issues from serpentine and other metamorphic rocks of cretaceous age. Around volcanoes petroleum is often seen floating upon the surface of the water, as around the volcanic isles of Cape Verd; and to the south of Vesuvius a spring of it rises up through the sea. Springs also issue beneath the sea upon the coast of Venezuela, and in the Santa Barbara channel off the coast of southern California. Wells sunk near together vary in their yield, in the depth at which they become productive, and even sometimes, as in the Kanawha region of Virginia, in the quality of the oil they afford.—Petroleum from different localities varies considerably in character. The substance is ordinarily of a greenish hue by reflected light, and brown by transmitted light, more or less deep and opaque; but some varieties of light clear oils are reddish. The oils of northern Italy are of the latter class. At Baku it is observed that the oil from the central portion of the tract is clear and pure as if distilled, and by its faint yellow tint resembles Sauterne wine. That obtained nearer the sides of the tract is darker, gradually changing to a yellowish green, then reddish brown, and finally to asphalt. Those of southern California are leek-green when taken fresh from the rock; but they soon become brown and black, changing to maltha and asphalt. The Canadian oils are black, but those of Pennsylvania, Ohio, West Virginia, Rangoon, and many other localities, are for the most part of the ordinary color. All have a disagreeable, pungent odor. In the province of Ontario oil has been obtained remarkable for its garlicky odor. The quality of petroleums is indicated by their specific gravity, and this is taken by Baumé's hydrometer, the higher degrees of which mark the lighter oils, such as are most esteemed. The best are some of those of Oil creek, of 46° B. Others of the same district increase in density to 38°. At Tidioute oils are obtained of 43°. At Franklin they rate from 33° to 36°, and on French creek also they are heavy. At Mecca, Pa., they are dark, thick, and heavy, so that when cold they refuse to flow. Their density is 26° or 27°, corresponding to a specific gravity of about 0·90. The oil from Cuba, N. Y., resembles that of Franklin, marking 32°. Rangoon petroleum is described as of semi-fluid consistence, like goose grease. As it occurs in nature it is of no definite composition, but consists of various oily hydrocarbons, which hold in solution paraffine and other substances, some of which contain nitrogen. When of the greatest fluidity they resemble naphtha, and have been called by this name, and also oil of naphtha. As the proportion of carbon increases, the mixture becomes thicker and darker, resembling tar in appearance; and at length, by further diminution of the fluid ingredients, it passes into asphalt. There are two classes of petroleums which are quite distinct. The first may be termed paraffine oils, as they invariably yield paraffine by distillation; the second never yield paraffine. The first are exceedingly stable compounds, changing but little if at all on exposure to the atmosphere; these form the greater portion of the petroleums of commerce. The second are very unstable, and change rapidly on exposure to the atmosphere to maltha and asphalt. While they are found in some localities in large quantities, they have as yet proved of limited value for commercial purposes when compared with the other variety. The oils of California and Trinidad are of this class.—Comparatively little is known of the chemical composition of petroleum. Warren and Storer in this country and Pelouze and Cahours in France have investigated the more volatile portion of the Pennsylvania and Rangoon oils, but whether the substances they obtained are educts or products is uncertain. These two petroleums were found to be similar. Two groups of hydrocarbons were isolated, having the constitution of the hydrides of the alcohol radicals, the consecutive members of which were isomeric and differed in their boiling points by 30° C. There were also found the more volatile members of the ethylene series, and in the Rangoon petroleum some of the members of the benzole series. Very little is known concerning the denser constituents, whose boiling points are above 200° C. Some petroleums contain more than one per cent. of nitrogen, others contain sulphur. The amount of carbon increases with the density, and that of hydrogen decreases.—The process of sinking the wells is described in the article ARTESIAN WELLS. The productive wells vary greatly in depth. In some large supplies have been afforded at 60 or 70 ft., and in others at greater depths to over 1,000 ft. Most of the oil is from wells over 180 ft. deep. Shallow wells, that are exhausted by pumping, are successively made to yield again by sinking them deeper. The oil is found at several zones or oil-producing belts at different depths. Several wells may continue in successful operation near together without seeming to draw upon each other; and again wells may be sunk near others that are producing largely, or near the natural springs of oil, and prove unsuccessful. The pumps are sunk deeper into the wells as the supply goes down; and it is observed that if the pumping is interrupted for a day, the product obtained when it is renewed will be water, which is more or less salt. At some wells the flow of water has continued during several days' pumping before the oil was recovered. This never seems to fail entirely, unless it be from some obstruction arresting the flow, and then recourse is had to sinking deeper or enlarging the bore of the hole. Salt water commonly comes up with the oil, and is separated from it by standing in the vats into which the products are received. The proportion of this to the oil is very variable, and the quantity of oil daily pumped from a single well is far from being regular. Sometimes the oil, when first struck, rushes up with great violence by reason of the pressure of the carburetted hydrogen gas that accompanies it. This produces a spouting or flowing well, from some of which the yield has been more than 1,000 barrels a day for a long time; but the quantity gradually diminishes until they cease to be flowing wells, and they are then pumped. In a few instances the oil has leaped forth with such violence as to be beyond control, and immense quantities have been lost. These fountains of oil have sometimes taken fire, producing terrific conflagrations and presenting scenes of appalling grandeur.—Petroleum acquired a reputation as a medicine before it was used for other purposes; and there is no doubt it possesses some virtue, especially as an outward application in diseases of the skin, chilblains, rheumatism, &c. Taken internally in doses of 30 to 60 drops, it acts as a sudorific and stimulating anti-spasmodic. It has been recommended for disorders of the chest, and in Germany as a remedy for tapeworm. Its use for illuminating purposes has become of vast importance; and it is becoming each year of more extended application in technology, the waste products of its manufacture yielding a great variety of useful products. (See PETROLEUM PRODUCTS.) Very large quantities are used raw or unrefined; but the purposes to which it is applied are few, and the consumption is almost exclusively confined to the denser varieties, such as are found in Ohio and West Virginia. It is used chiefly as a lubricator, for fuel, and in the manufacture of gas. As a lubricator for heavy journals, either pure or mixed with tallow or animal oils, it is of great value, especially for the axles of railroad cars, in rolling mills, &c. For fuel it has been made the subject of many elaborate experiments and voluminous reports from the government engineers of this and other countries, many of which have been highly favorable. Several furnaces have been contrived for its combustion for steam and other purposes, yet it has been but little used as fuel. The reason for this apparent neglect of such an abundant, cheap, and efficient source of artificial heat is no doubt thus far to be attributed to its comparatively dangerous properties and to other difficulties attending its transportation and storage. These difficulties and the prejudices attending them are gradually disappearing, and we seem to be rapidly approaching a time when the consumption of crude petroleum, especially for steam purposes, will become enormous. It has been used to a limited extent for the manufacture of illuminating gas. For this purpose it is allowed to drip on to coke heated red hot in a retort, and the gaseous products conducted to a gasometer.—The table below will give the reader some idea of the vast amount of this material which has been yielded by the Pennsylvania oil region alone, from 1860 to 1873 inclusive:

YEARS.	Bbls. of 40 gallons.	YEARS.	Bbls. of 40 gallons.
1860............	500,000	1867............	3,347,000
1861............	2,118,000	1868............	3,583,660
1862............	3,056,000	1869............	4,210,720
1863............	2,631,000	1870............	5,673,195
1864............	2,116,000	1871............	5,715,900
1865............	2,497,000	1872............	6,531,675
1866............	3,597,000	1873............	9,884,719

The average daily product of this region from the discovery of petroleum to Jan. 1, 1874, is 10,852 bbls. The total product for the same time is 55,461,319 bbls. During the year 1873, 379,634 bbls. of crude oil was exported from New York city, the product of the Pennsylvania wells.

PETROLEUM PRODUCTS. The manufacture of commercial products from petroleum dates from the discovery of the crude material in large quantities in Pennsylvania. From the time the wells of that region first attracted attention, numerous individuals, some of whom were engaged in the manufacture of kerosene (see **Kerosene**), began to experiment with petroleum with a view to obtain materials resembling the products that were then being distilled from coal. These earlier experiments and the small cost of producing kerosene from this source very soon led to the substitution of petroleum for coal as the crude material for illuminating oil, and almost all the manufacturers changed their apparatus and establishments into petroleum refineries. The high price of kerosene at that time left such a very wide margin for profit that the methods of carrying on the business, crude as they were in almost every particular, were still very successful. In 1861, three years after petroleum first attracted special notice, there were refineries in nearly every city on the Atlantic coast, from Baltimore to Portland, and the oil regions were full of them; but it was four years later before coal was entirely disused in one or two establishments. For several years the only petroleum product considered of value was kerosene. The light and heavy products were either used as fuel or thrown away. As the profits of the business were lessened from extensive competition, attempts were made to utilize the "by-products." One after another found useful applications, until now at least ten commercial articles are obtained, and some of them are consumed in enormous quantities. These are:

ARTICLES.	Sp. gr.	Beaumé.	Boiling point.
Rhigolene	·625	...	65° F.
Gasolene	·665	85°	120
C Naphtha	·706	70	180
B "	·724	67	220
A "	·742	65	300
Kerosene	·804	45	350
Mineral sperm oil	·847	36	425
Neutral lubricating oil	·883	29	575
Paraffine " "	...	...	...
Paraffine wax	·848	...	...
Residuum	...	...	...

Rhigolene is the most volatile fluid that can be produced by condensing the first portions distilled from gasolene in a mixture of ice and salt. It is the lightest of all known fluids, and its evaporation at ordinary temperatures is so rapid as to cause the mercury to descend to −19° F. in 20 seconds. It was prepared at the suggestion of Dr. H. J. Bigelow of Boston, and has been used to a considerable extent for producing local anæsthesia in surgical operations. Gasolene is the lightest product from petroleum that is produced in large quantities. It is used in the carburetters of automatic gas machines, and is admirably adapted to such purposes. A, B, and C naphthas are applied to a variety of uses in mixing paints and varnishes, and dissolving resins and other substances; but they have little commercial value, as their uses are quite limited. Kerosene has already been discussed. (See **Kerosene**.) Mineral sperm is the name given by Joshua Merrill, of the Downer kerosene oil company, to a petroleum product discovered by him. This is an illuminating oil intermediate in density between kerosene and lubricating oil. It is volatile only at very high temperatures, and is consequently free from the objections that have been urged against more easily inflammable oils. As this oil has very little odor and will not take fire at any temperature below 300° F., it is especially valuable for use on railroads and ocean steamers. Neutral lubricating oil is another product discovered by Mr. Merrill. He has prepared it of a light straw color, and with but little more taste or odor than sweet oil of almonds. It is by far the most pleasing and valuable lubricating oil yet prepared from any mineral source. The so-called paraffine lubricating oils, though of about the same density, contain a certain proportion of lighter and more volatile oils, which have a very pungent odor and burning acrid taste. These are unavoidably formed during the distillation of the heavier portions of the crude petroleum. By distilling in such a manner that the oils are never heated above their boiling points, this lighter oil is removed, and the neutral odorless oil is left in the still. Mixtures containing as much as 80 per cent. of this oil to 20 per cent. of sperm or other animal oil have the odor and taste of the animal oil. Both these mixtures and the pure oils have been used instead of the animal oils in immense quantities for oiling wool and machinery, the latter being considered especially valuable for oiling spindles in cotton mills. The ordinary paraffine lubricating oils are of various qualities, much depending upon the care and expense involved in their preparation. Those prepared by simply fractioning the distillate from petroleum are dark-colored, of very rank disagreeable odor, and are adapted to comparatively few uses, while some of the better qualities are nearly as valuable as the neutral oil prepared by Mr. Merrill. Paraffine wax has been described elsewhere. (See **Paraffine**.) Residuum is the black residue remaining in the still from the distillation of crude petroleum. It is used by the manufacturers of paraffine and lubricating oils, and also to a limited extent for lubricating heavy journals.—The crude oil is stored in large, often enormous wrought-iron tanks. When it is shipped in wooden barrels they are coated with glue upon the inside. For transportation on long voyages the lighter products, including kerosene, are put up in tin cans holding five gallons each, and hermetically sealed by soldering on the cover. The crude oil, as it flows from the wells or pumps, is received into large tanks, where it is allowed to stand for some time in order that the water may separate and settle to the bottom. When the wells are some distance from a railroad track, the oil is often transported to the track by being forced through a pipe laid along the ground. Large quantities have been floated down the Alleghany river in scows and barges called "flats." Many of the large establishments transport the crude oil in what are called tank cars. These are ordinary platform cars, upon each of which are constructed two large tanks. These are filled at the wells and carried in long trains to all parts of the country. When they reach their destination they are emptied into iron tanks, often of immense size, when the oil is again allowed to settle so that the last traces of water and any sand or other impurity may be removed.—The apparatus for manufacturing petroleum consists of stills of various forms and sizes, with worms for condensing the vapors, and agitators in which the oils are treated with chemicals. The stills are usually cylindrical, and are placed either on one end or horizontally. They are either cast iron with wrought-iron bottoms or made wholly of boiler iron, and hold from 1,000 to 80,000 gallons. The smaller sizes are heated by one fire, the larger by several. Sometimes the stills are encased in wood or brick work to prevent loss of heat. Superheated steam is frequently introduced into the stills, especially during the distillation of the heavy oils. The very large stills recently constructed are used for carrying on the process known as "cracking." After the removal of the gasolene and different grades of naphtha, the remainder is subjected to destructive distillation. Any method that will heat the vapors above the boiling point of the oil will decompose the heavy oil, with deposition of carbon and the production of lighter oils richer in hydrogen. This effect has been produced by distilling under pressure; but the method usually employed is the one before mentioned. The distillation is kept up in such a manner that as the temperature increases and the heavy oils pass into vapor, the vapors are condensed upon the high dome of the still and either fall back in drops or flow down the sides. In either case they reach the surface of the boiling oil beneath, which has meantime been heated above the boiling point of that which falls upon it. The result is a decomposition of the latter into a more volatile oil containing proportionally more hydrogen, and carbon which is deposited. This process may be continued until nothing remains in the still but coke; but it is not usually carried to that point, as the coke is difficult to remove from the still. The tarry matter left in the still is known in commerce as "residuum." The treatment of the oils is confined to the heavier kinds, including kerosene. The naphthas do not require treatment. In many establishments all the oils treated are alternately agitated with about 5 per cent. of strong sulphuric acid and the same amount of strong solution of caustic soda. In others, solution of caustic soda is put into the stills, and sometimes the soda is used solid. The sulphuric acid removes a number of unstable compounds, by decomposing some of them and uniting with others. The caustic soda removes the excess of acid and acid compounds, and leaves the oils pure. The odor of the crude distilled oils is exceedingly offensive; the action of the caustic soda removes these disgusting compounds, and gives the finished oils the peculiar balsamic odor by which they are distinguished. The spent sulphuric acid is technically known as "sludge," and is used by the manufacturers of superphosphate of lime. The spent caustic soda is often recovered as a carbonate and reconverted into caustic soda. Nitric acid and bichromate of potash have also been used in place of sulphuric acid. In many of the older refineries the oil was exposed in shallow tanks beneath a skylight, in a manner exactly similar to the treatment employed for bleaching sperm oil. This is an admirable method for obtaining a complete separation of the last minute particles of caustic soda, but it is not equal to finishing by a last distillation, which is the method now employed in the best establishments.—The demand for gasolene for automatic gas machines has led to the establishment of a few manufactories in which this very volatile product is separated from the heavier grades of naphtha. Other separate establishments have been erected for the manufacture of paraffine and lubricating oils from residuum. These purchase the heavy waste products from the large kerosene manufactories, and by special processes convert it into useful commercial articles.—The manufacture of petroleum products from the crude oil is carried on either to obtain the largest number of products of the finest quality, or to obtain the largest yield of kerosene without regard to any other product. Probably the finest petroleum refinery in America, if not in the world, is that of the Downer kerosene oil company of Boston, Mass., and Corry, Pa., of which Joshua Merrill is the manufacturing chemist. Mr. Merrill began the manufacture of hydrocarbon oils for illuminating and other purposes as early as 1852, and from that date until the introduction of petroleum in 1860 a great variety of crude materials had been subjected to his skilful treatment with unvarying success. The works in Boston were originally built for the working of coal, boghead shale, and albertite, but since 1865 nothing but petroleum has been used there. All of the products enumerated above are manufactured there excepting paraffine lubricating oil and residuum. The branch establishment at Corry, Pa., is used only for the distillation of crude petroleum, the distillates being shipped to Boston for treatment. The processes employed at Boston are as follows: The crude oil is pumped from the tank cars into settling tanks placed under ground. After settling, it is pumped into large wrought-iron stills or upright cylinders which hold about 12,000 gallons each. In these stills the oil is heated by steam alone, which removes the various grades of naphtha, they constituting about 15 per cent. of the crude petroleum. These distillates are condensed in iron pipes surrounded by cold water, and conducted into different receptacles. The rhigolene is obtained by distilling the gasolene a second time. The crude oil remaining in the naphtha stills is then pumped into stills heated by direct fires underneath, and having a capacity of about 1,000 gallons. This charge is distilled to coke which remains in the still, to uncondensable gases which pass into the atmosphere, and to liquid oils which are condensed and separated, according to their density, into No. 1, crude burning oil; No. 2, intermediate oil; and No. 3, crude lubricating oil. Each of these numbers is again distilled by itself in apparatus of the same size as that used for the first distillation, and the distillate from each is again separated, as before, into lighter, intermediate, and heavy oils. No. 1 from this second distillation is thoroughly agitated with strong sulphuric acid, and then with solution of caustic soda. It is then redistilled, and yields from the still about 80 per cent. of finished kerosene and mineral sperm, and nearly 20 per cent. of dense oils. No. 2 is redistilled before treatment with acid and alkali, and yields principally crude lubricating oil. No. 3 is treated with sulphuric acid and then redistilled with caustic soda in the still. The dense paraffine oil that collects in the receiver is placed in wooden barrels in ice houses, where it remains for from seven to ten days, during which the paraffine wax crystallizes so that the mass retains the form of the barrel. The crude paraffine is put into strong cloth bags, which are piled with iron plates between them upon the bed of a powerful hydraulic press, and subjected to very heavy pressure. The crude paraffine is crystallized repeatedly from solution in naphtha until it is perfectly pure and white. (See PARAFFINE.) The heavy oil is treated by the patent deodorizing process. This consists in carefully heating the oil in stills by fires placed underneath, and at the same time injecting steam, which is superheated by being passed through a coil contained within the still and covered by the heated oil. By this means 20 or 30 per cent. of the contents of the still is separated, and that which remains in the still when cooled is ready for sale as neutral lubricating oil. The highly colored last distillates that accumulate from all of these distillations are called "cokings," and yield when distilled by themselves crude lubricating oil. The products of this establishment for 1873 were: naphtha (all grades), 300,000 galls.; kerosene, 1,250,000; mineral sperm, 250,000; neutral lubricating oil, 600,000; paraffine wax, 500,000 lbs. These amounts, large as they are, bear no comparison to the enormous quantities handled by some of the refiners nearer the oil regions, where the object sought is the largest possible production of kerosene. Of these the "Standard Oil Company" of Cleveland, O., and New York city, is the best example. The only articles produced by this company are the different grades of naphtha, kerosene, and paraffine lubricating oils. Their works and apparatus are adapted to cracking the crude oil and treating the distillates in quantities estimated by millions of gallons. They manufactured during the year 1873 of naphthas (all grades), 12,424,006 galls.; kerosene, 68,518,424; paraffine lubricating oil, 1,540,716. Of this enormous production 77 per cent. is kerosene, which is sent to all parts of the world.—A modification of this method of conducting the business has been adopted in a few instances. The crude kerosene is distilled at or very near the wells. The petroleum is cracked, and the naphthas and residuum are either used as fuel or sold to manufacturers of gasolene and paraffine oils. The crude distillate is shipped in glued barrels to New York, and there treated. In this way freight is saved on all the impurities of the oil, and also on the light and heavy products which at best are worth no more than cost. There is also a further saving of loss by leakage, caused by the water acting on the glue with which the barrels are lined. The distillate is treated where it can be done cheapest and with least expense for transporting chemicals. An establishment at Hunter's Point, L. I., had a capacity for treating 700 bbls. of distillate daily, which was received from several distilleries in the oil regions. The entire product was exported.—No manufactured articles put upon the market vary more in quality than the products obtained from petroleum, especially kerosene. While new applications are constantly being found in the arts for the various grades of naphtha, still the purposes for which it can be used are comparatively few. Vast quantities of it have been burned under stills, and in some localities have been thrown away or sold at the purchaser's price. As a result, refiners of oil constantly labor under the temptation to throw the largest possible amount into the illuminating oil. If the only effect resulting from such a course was the increased rapidity with which the oil burned, and the consequent reduction in its value, the evil might be borne; but to this must be added the fact that to this cause may be traced all those calamities which follow explosions of kerosene lamps. Frequent and dreadful as these disasters are, it is with great difficulty that the public can be convinced that all grades of naphtha and all fluids containing them, when burned in any kind of lamp (explosive or non-explosive), are more dangerous than gunpowder, because so much more carelessly used. These inflammable and, under certain circumstances, terribly explosive fluids, are nearly worthless as articles of commerce, and they burn so rapidly that they are of comparatively little value to the consumer as materials for illumination. No more than 5 per cent. will render kerosene inflammable at all ordinary temperatures, and liable to produce an explosion at any time when the vapors become mingled with air in proper proportion. These properties that render naphtha dangerous are inherent in the constitution of the substance itself, and no human art can change them. Yet there are those who pretend to invent non-explosive naphtha stoves and lamps, a thing that never was and never can be invented; there are those who manufacture and sell kerosene containing naphtha, and others who purchase the two, mix them, and sell them. The victims are generally women and helpless children. Good kerosene is always safe under all conditions attending its use. It is naphtha that injures the quality of kerosene, and naphtha is never safe under any circumstances. So alarmingly frequent have these accidents become, and so disastrous have been the results, that in all civilized countries very stringent laws have been enacted, restraining and regulating the sale and storage of petroleum and its products. Nearly every state in the Union has passed similar laws, and in many sections of the country kerosene may be purchased with comparative safety, as the different kinds of naphtha are regarded as dangerous, and are sold under proper restrictions. Yet notwithstanding these laws, and the general recognition of the fact that poor oils are very unsafe, a great deal of bad kerosene is burned every year, particularly in our large cities, and at the same time much property is destroyed and many lives are lost. All lamps are safe with good oil, and the quality of any oil can be ascertained easily by the following test: Take a pint tin cup, fill it nearly full of water warmed so that a thermometer immersed in it will show 120°, pour a small quantity of oil on the water, stir a little, then pass a lighted match quickly but closely over the surface of the oil once; if it ignites, the oil is unsafe. If purchases are made of from three to five gallons at a time, and this test is made, people can protect themselves.

PETROMYZON. See Lamprey.

PETRONIUS ARBITER, the author of *Petronii Arbitri Satyricon*, a work of no certain date, in prose and verse, describing the adventures of several young debauchees in the south of Italy, particularly Naples and its environs. It has been maintained that he was the Caius Petronius spoken of by Tacitus (*Ann.* xvi. 18, 19) as the most elegant voluptuary of the days of Nero, the *arbiter elegantiæ* of that monarch. His life being threatened by the jealousy of Tigellinus, he opened his veins, and, occasionally checking the flow of blood by bandages, sank so gradually that his death seemed to be the result of natural causes. The best edition of the extant fragments of the *Satyricon* is that of Burmann (2 vols. 4to, Amsterdam, 1743), and there are English translations.

PETROPAVLOVSK. I. A town of Asiatic Russia, in the littoral province (Primorsk), on the S. E. coast of the peninsula of Kamtchatka, in lat. 53° 1′ N., lon. 158° 43′ E.; pop. in 1867, 479, exclusive of the garrison. It is the capital and principal military station of the district of the same name, formerly province of Kamtchatka. The harbor, in Avatcha bay, is good, has a lighthouse, and is defended by two forts. The town contains large stores of the Russo-American commercial society. Large quantities of dried fish are exported. II. A town of Siberia, in the province of Akmolinsk, on the river Ishim, 175 m. W. N. W. of Omsk, on the great post road of Siberia; pop. in 1867, 8,220. It is an important military post, and has a cannon foundery. A large trade is carried on with other parts of Siberia, Turkistan, and the W. part of China, Petropavlovsk being a station for the caravans from Bokhara, Khiva, and the Kirghiz steppe.

PETROZAVODSK, a fortified town of Russia, capital of the government of Olonetz, on the W. shore of Lake Onega, 185 m. N. E. of St. Petersburg; pop. in 1867, 10,910. It contains six churches, a gymnasium, an imperial cannon foundery, where anchors are also cast for the navy, two extensive docks for lake vessels, a lighthouse, and various manufactories. Large vessels navigate the rivers and lakes between this town and St. Petersburg.

PETRUS LOMBARDUS. See Lombard, Peter.

PETTENKOFER, Max von, a German chemist, born at Lichtenheim, Bavaria, Dec. 3, 1818. He studied at Munich, was employed in the Bavarian mint from 1845 to 1847, and was afterward professor of medicine. In 1865 he became one of the editors of the *Zeitschrift für Biologie*. Among his writings are: *Die atmosphärische Luft in Wohngebäuden* (Brunswick, 1858); *Ueber Oehlfarbe und Conservirung der Gemäldegalerien durch Regeneration der Bilder* (1870; 2d ed., 1872); and *Die Verbreitungsart der Cholera in Indien* (1871).

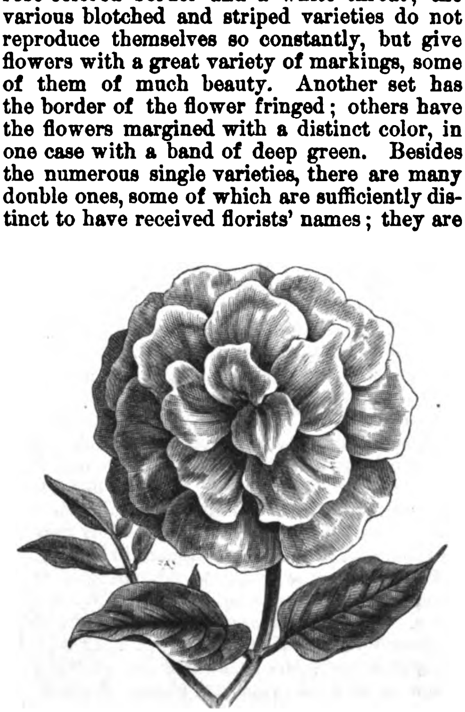
PETTER, Anton, a German painter, born in Vienna, April 12, 1783, died there in 1858. He visited Rome in 1808, and won several prizes at the academy of Vienna, to which he was admitted in 1814 in reward for his "Meleager murdered by his Mother in the Arms of his Wife." In 1820 he became professor, and in 1828 director of that institution. Among his best works are the "Meeting of Maximilian with his Bride, Mary of Burgundy," "Rudolph of Hapsburg," "Queen Joan beside the Coffin of her Husband Philip," and "Charles V. visiting his Prisoner, Francis I."

PETTIS, a W. central county of Missouri, drained by La Mine river and branches; area, about 600 sq. m.; pop. in 1870, 18,706, of whom 2,126 were colored. It has an undulating surface with extensive prairies and forests, and the soil is fertile. The Missouri Pacific railroad and the Lexington branch pass through it. The chief productions in 1870 were 270,245 bushels of wheat, 920,178 of Indian corn, 312,416 of oats, 55,250 of potatoes, 146,905 lbs. of butter, 48,989 of wool, and 10,817 tons of hay. There were 7,060 horses, 2,012 mules and asses, 5,876 milch cows, 7,245 other cattle, 17,928 sheep, and 25,726 swine; 2 manufactories of boots and shoes, 5 of carriages and wagons, 1 of patent medicines, 4 of saddlery and harness, 1 brewery, and 5 flour mills. Capital, Sedalia.

PETTRICH, Ferdinand, a German sculptor, born in Dresden in 1798, died in Rome, Feb. 14, 1872. He was a son of the sculptor Franz Pettrich (1770–1844), studied in Rome under Thorwaldsen, and in his youth spent some time in the United States and in Brazil. Among his best known works are "Belisarius," "Christ," and "Day and Night."

PETUNIA, the botanical as well as the garden name for an ornamental plant, from *petun*, a name used by South American Indians for tobacco, and applied to this related genus of *solanaceæ*. The plants are perennial herbs, becoming woody at the base; the leaves alternate, simple, and as well as the young stems sticky with a viscid pubesence; the flowers are axillary and solitary; the lobes of the calyx spoon-shaped; the corolla funnel-formed or salver-shaped; the spreading limb slightly five-lobed and somewhat unequal; the five unequal stamens included within the tube; the ovary ripening into a two-celled, two-valved pod, with numerous minute seeds. The species first introduced was *P. nyctaginiflora*, brought from Brazil in 1823; it originally had a white flower with a very long tube, and was for a long time a popular plant; in 1831 it was followed by *P. violacea*, a much more slender and weaker plant, with rose-colored or violet purple flowers, having a shorter and broader tube than the other; this also became a favorite garden plant. From these species there have been obtained, by hybridizing, crossing, and selecting, a large number of varieties, so much superior to the originals that these are rarely seen in cultivation; some of these varieties are so well fixed that they come true from seed, like the "Countess of Ellesmere," which has a deep rose-colored border and a white throat; the various blotched and striped varieties do not reproduce themselves so constantly, but give flowers with a great variety of markings, some of them of much beauty. Another set has the border of the flower fringed; others have the flowers margined with a distinct color, in one case with a band of deep green. Besides the numerous single varieties, there are many double ones, some of which are sufficiently distinct to have received florists' names; they are often so very double that the original form of the flower is lost in a confused mass of petals. Although the petunias are perennials, they flower so soon from the seed that they are treated as annuals. They are much used for planting in masses; the stems spread for several feet, and the plants should not be crowded; as single specimens, they are best trained to a stake. The double kinds are unsuited for outdoor culture, their flowers being so heavy that they are broken by winds, and they decay when wet. Choice kinds, and especially the double ones, are propagated by cuttings.

Petunia—Garden hybrid, single.



Petunia—Double-flowered.

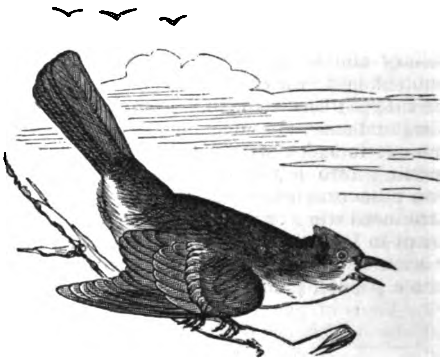
PEUCER, Kaspar, a German reformer, born in Bautzen, Jan. 6, 1525, died in Dessau, Sept. 25, 1602. He studied at Wittenberg, where in 1554 he became professor of mathematics and subsequently of medicine. He was a son-in-law and a zealous disciple of Melanchthon, after whose death in 1560 he became physician to Augustus, elector of Saxony, who regarded him as the principal exponent of Melanchthon's views, and allowed him to select professors for the university of Wittenberg. But from 1574 to 1586 he was imprisoned on account of his alleged Crypto-Calvinistic doctrines, and subsequently he resided at Zerbst as physician to the reigning prince. He published several astronomical and other books, and an edition of Melanchthon's collected works (Wittenberg, 1562–'4). Among recent works relating to him is *Kaspar Peucer und Nikolaus Krell*, by Henke (Marburg, 1865).

PEUTINGER, Konrad, a German antiquary, born in Augsburg, Oct. 14, 1465, died there, Dec. 24, 1547. He obtained his education in several Italian universities, and during a large portion of his life was actuary in his native city. He published *Sermones Convivales de mirandis Germaniæ Antiquitatibus* (1506), and several minor writings on antiquarian subjects. He is known from a map in his possession, since called the *Tabula Peutingerana*, giving the military roads of a large portion of the Roman empire, probably based upon an itinerary of the 4th century. Peutinger obtained this map from Konrad Celtes, who had borrowed it from the Benedictine convent at Tegernsee. Fragments of it were published in Venice by Marcus Welser in 1591, with the title *Fragmenta Tabulæ Antiquæ ex Peutingerorum Bibliotheca*. Thereafter the map seems to have been lost till 1714, when it was found again among the papers of the Peutinger family. It is now in the Vienna library. The first complete edition of it was prepared by Scheyb in 1753, and another by Mannert in 1824.

PEWEE, a name given to several species of American flycatchers of the subfamily *tyranninæ*. The common pewee, or Phœbe bird (*sayornis fuscus*, Baird), is 7 in. long and 9½ in alar extent; the general color of the plumage is dull olive-brown above, darkest on the head, and yellowish white below; quills brown, most of the wing feathers edged with dull white; tail forked, the outer edge of the lateral feather dull white; bill and feet black.

Common Pewee (Sayornis fuscus).

This lively species is found throughout eastern North America, from Newfoundland to Florida. In the middle states it arrives from the south early in April, and gets out a first brood by the middle of May, and a second by the beginning of August; it leaves again for the south in October, migrating by night. The nest resembles that of the barn swallow, being made of mud, grasses, and moss, lined with softer materials, and attached to a rock, wall, or rafter; they repair the same nest year after year; the eggs, four to six, are white, with a few reddish spots at the larger end; the young are hatched out on the 13th day, and leave the nest in 16 more; the parents show great affection for them, snapping the bill and darting boldly toward all intruders. Its flight is rapid, with frequent sailings; it is fond of vibrating the tail, erecting the crest, and making a tremulous motion with the wings; it feeds on insects, which it takes with great dexterity on the wing, swallowing them whole, and ejecting the hard parts like the swallows and goatsuckers.—The wood pewee (*contopus virens*, Cab.) is 6½ in. long, and 10¾ in extent of wings; the general color above is brownish olive, brownish black on the head; two pale grayish bands across the wings; a narrow white circle around the eyes; greenish yellow below, with a grayish tinge on the throat and breast. It is fond of the most gloomy forests, but is sometimes seen in shady orchards, and in the autumn near the edges of still ponds surrounded by woods. The flight is swift, with sudden sweeps in pursuit of its insect prey; it seizes with certainty moths and other nocturnal insects when it is very dark; it feeds sometimes also on berries. Its notes are low, mellow, and sweetly melancholy when in its favorite haunts; its common name, like that of others of the subfamily, is derived from its utterance of the syllables "pe-wee," singly or repeated. It reaches the middle states about the 10th of May, going as far north as New Brunswick, south to New Granada, and west as far as the high central plains. The nest is delicate in form and structure, covered by lichens, and so apparently a part of the branch to which it is attached as to be detected with difficulty; the eggs are four or five, light yellowish, with reddish spots at the larger end; in the middle states two broods are raised in a season; it boldly attacks man, beast, or bird approaching its nest.—Many other dark-colored flycatchers are called "pewee," as for instance the short-legged pewee (*C. Richardsonii*, Cab.), much resembling the last species, and found on the western coast of North America.



Wood Pewee (Contopus virens).

PEWTER, an alloy of tin with other metals, such as lead, bismuth, antimony, copper, and zinc, in varying proportions. The English pewterers recognize three kinds, called plate, trifle, and ley pewter; the first and hardest being used for plates and other household articles, the second for beer pots, and the third for larger wine measures. Plate pewter is composed of 100 parts of tin, 8 of antimony, 2 of bismuth, and 2 of copper, and has a bright silvery lustre. Trifle contains 83 parts of tin and 17 of antimony, with usually considerable lead. Ley contains 4 parts of tin and 1 of lead, and is generally known as common pewter. Another formula is, tin 112, lead 16, copper 6, zinc 2. A kind of hard pewter is composed of tin 96, antimony 8, copper 2. Some think the best pewter is made of tin 100, antimony 17; others that the finest is made by adding "temper" (which is composed of 2 parts of tin and 1 of copper) to tin in the proportion of from 0·08 to 1 per cent., or one third that proportion of copper. Britannia metal, consisting of tin 86, antimony 10, zinc 3, copper 1, and Queen's metal, containing tin 9, antimony 1, bismuth 1, lead 1, are kinds of pewter used for domestic utensils. Some inferior kinds of pewter contain 50 per cent. of lead, by which poisonous properties are imparted. To obviate the difficulty, the French government appointed a commission, who determined that no more than 18 parts of lead might be safely alloyed with 82 parts of tin, and a standard was adopted of 83·5 tin and 16·5 lead in 100 parts, allowing 1·5 per cent. for unintentional errors. The density of this legal standard is 7·764; any increase of lead increases the specific gravity. Pewter vessels are formed by hammering, or by casting in moulds. When cast in pieces they may be joined together with soft solder. (See SOLDER.)

PEYER, Johann Konrad, a Swiss anatomist, born in Schaffhausen, Dec. 26, 1653, died there, Feb. 29, 1712. He graduated as M. D. at Basel in 1681, practised medicine there, and became professor of eloquence and afterward of logic and natural philosophy. He was distinguished for original dissections and observations on the closed glands of the mucous membrane of the small intestine; those which are collected into plates or patches are known by the name of Peyer's glands, or Peyer's patches. His description of these structures is given in the *Exercitatio Anatomico-medica de Glandulis Intestinorum earumque Usu et Affectionibus* (8vo, Schaffhausen, 1677). He also published *Methodus Historiarum Anatomico-medicarum* (Paris, 1678); *Pæonis et Pythagoræ Exercitationes Anatomicæ et Medicæ* (Geneva, 1681); and a treatise on comparative anatomy entitled *Merycologia, sive de Ruminantibus et Ruminatione* (Basel, 1685).

PEYRONNET, Charles Ignace, count de, a French statesman, born in Bordeaux in October, 1778, died at Monferrand, Gironde, Jan. 2, 1854. His father, an attorney of the parliament of Guienne, had been ennobled, and was guillotined during the revolution. In 1796 Charles was admitted to the bar in his native city. He was best known by his licentious life and many duels. In 1814 he figured among the royalist partisans who called in the English and proclaimed the Bourbons. After holding several judicial offices and serving as a deputy, he became in 1821 minister of justice in the Villèle cabinet. In 1822 he proposed the law for the restriction of the freedom of the press; in 1823 defended the armed intervention in Spain; in 1824 procured the reëstablishment of the censorship; in 1825 caused the adoption of the law against sacrilege; in 1826 attempted to have the right of primogeniture restored; and in 1827 tried to restrict the press still more, dissolved the national guard, and altered the jury law. The elections of 1828 obliged Charles X. to dismiss the Villèle cabinet; but in 1830 Peyronnet became minister of the interior under Polignac. He signed the ordinances of July 25, which brought about the revolution. After the outbreak he was arrested at Tours, was taken to Vincennes, arraigned with his colleagues before the court of peers, sentenced to perpetual imprisonment, and incarcerated at Ham, where he wrote an *Histoire des Francs* (2 vols. 8vo, 1835). Released after six years, he retired to private life.

PFÄFERS, or **Pfeffers,** a watering place of Switzerland, in the canton of St. Gall, 2 m. S. of Ragatz. It is more than 2,000 ft. above the sea, and has the so-called indifferent thermal springs, efficacious in rheumatism and nervous diseases. The springs were discovered in 1038. The gorge of the Tamina, leading from the village to the springs, is one of the most picturesque spots in the world.

PFALZBURG (Fr. *Phalsbourg*), a town of the German Reichsland of Alsace-Lorraine, included before 1871 in the French department of Meurthe, 25 m. N. W. of Strasburg; pop. about 4,300. It occupies a strong position on the W. declivity of the Vosges, commanding one of their passes, and under French rule was a fortress of the second class. In the late war it maintained a gallant defence against the Germans for four months under its commander Taillant, finally surrendering on Dec. 12, 1870. The number of prisoners was 1,900. In 1872 the dismantlement of the town was begun, the new frontiers having greatly diminished its strategical importance.

PFEIFFER, Ida, a German traveller, born in Vienna, Oct. 15, 1797, died there, Oct. 27, 1858. Her maiden name was Reyer. The extended journeys through which she became celebrated did not begin until she reached the age of 44, when, having been for some years separated from her husband, her two sons being established in life, and a sufficient sum having accumulated from her careful savings, she gratified her long cherished desire for travel by making a journey to Palestine in 1842, returning through Italy during the same year. In

1845 she visited Norway, Lapland, and Iceland. In June, 1846, she sailed from Hamburg on a voyage round the world, in company with Count Berchthold, from whom she subsequently parted. Disappointed in an attempt to cross South America, she continued her journey from Rio de Janeiro by water, touching at various points, crossing from Valparaiso to Macao, and stopping at Tahiti. From China she went to Calcutta, and thence across India and Persia, and completed her journey by visiting the Black sea, Turkey, and Greece. Aided by the Austrian government, she again embarked in the spring of 1851, and from London proceeded to the Cape of Good Hope, intending to visit the interior of Africa; but, deterred by the great cost of the undertaking, she went on to the East Indian islands, and thence across the Pacific to California. After travelling in South America, she visited the United States and Canada in 1854, and sailed for Liverpool in November. Her subsequent journeys were to the Azores in 1855, and to Madagascar in 1856–'7. Here she arrived in company with a Frenchman, who was soon arrested for a conspiracy to dethrone the queen, and was ordered with his companion to leave the island. Mme. Pfeiffer's death was caused by a malarial fever contracted in Madagascar. She wrote *Reise einer Wienerin in das Heilige Land* ("Journey of a Vienna Woman in the Holy Land," 2 vols., Vienna, 1843); *Reise nach dem skandinavischen Norden und der Insel Island* (Pesth, 1846; English translation, "Journey to Iceland, Sweden, and Norway," London, 1852); *Eine Frauenfahrt um die Welt* (3 vols., Vienna, 1850; English, "A Woman's Journey round the World," London, 1854); and *Zweite Weltreise* (Vienna, 1856; English, "Second Journey round the World," London, 1857). See also "The Last Travels of Ida Pfeiffer," with a biography (London, 1861).

PFISTER, Albrecht, a German printer of the 15th century, born about 1420, died about 1470. He was a card painter in Bamberg, but about 1455 began to print with movable types. The types of Pfister, although similar to Gutenberg's, are peculiar. He began with the printing of school and prayer books, and fragments of Latin grammars of his work have lasted to our time. Among his productions were indulgences printed with metal types of the years 1454 and 1455, an almanac of 1457, and a *Biblia Pauperum*. His great work is the Latin 36-line Bible in 3 vols. folio, and consisting of 881 leaves.

PFORZHEIM, a town of Baden, at the confluence of the Nagold and the Enz, and at the foot of the Black Forest, 16 m. S. E. of Carlsruhe; pop. in 1871, 19,801. It has an ancient castle, the church of which contains the tombs and monuments of members of the grand-ducal family, a deaf and dumb institution, an insane asylum, an orphan asylum, and poorhouses. Its manufactures include jewelry, cloth, chemicals, oil, paper, and leather.

PHÆACES. See SCHERIA.

PHÆDO, or **Phædon,** a Greek philosopher, who flourished in the early part of the 4th century B. C. He was a native of Elis and of noble birth, but becoming a prisoner of war, was brought to Athens and sold as a slave. Socrates obtained his release, and Plato introduces him in his dialogue on the death of Socrates, which bears the name of Phædo. He finally returned to Elis and became the founder of the Elean school of philosophy.

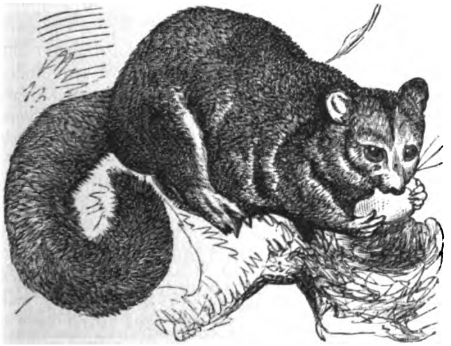
PHÆDRA, in Greek legends, the wife of Theseus and daughter of Minos, king of Crete, and of Pasiphaë, and sister of Ariadne. Her stepson Hippolytus, with whom she had fallen in love, refusing to gratify her passion, she accused him to his father of an attempt upon her honor. Theseus hereupon cursed his son, and asked Neptune to destroy him, which prayer the god complied with. When the death of Hippolytus became known to her, Phædra confessed her guilt and hanged herself, or according to some was put to death by her husband. The story of Phædra is the subject of tragedies by Euripides ("Hippolytus") and Seneca. Racine also wrote a tragedy on it.

PHÆDRUS, a Latin fabulist of the Augustan age. He was originally a slave, and was brought from Thrace or Macedonia to Rome, where he was freed by Augustus. He wrote 97 fables in iambic verse, distributed in five books, and says in the prologue to the first book that he has simply turned the matter of Æsop's fables into poetry; but in the prologue of the fifth book he says he often used the name of Æsop only to recommend his verses. The first edition was printed by P. Pithou (12mo, 1596), from a manuscript supposed to be of the 10th century. Later editions are by Orelli (Zürich, 1831), Dressler (Leipsic, 1838), O. Eichert (Hanover, 1865), and L. Müller (Leipsic, 1868).

PHAËTHON (Gr. Φαέθων, the shining), in Greek mythology, the son of Helios (the sun) and the Oceanid Clymene. To satisfy those who doubted whether the sun was his father, he obtained from Helios a promise that he would grant him any favor he asked, and thereupon demanded permission to drive his chariot across the heavens. The horses, despising their driver, turned out of their path, and when the chariot went so near to the earth as almost to set it on fire, Jupiter killed Phaëthon with a thunderbolt, and hurled him into the river Eridanus (Po). His sisters, the Heliades, who found him, were changed into poplars and their tears into amber.

PHALANGER, a genus of marsupial mammals, the type of the family of *phalangistidæ*, so called from having the second and third toes of the hind foot united in a common integument. They are expert climbers, dwelling upon trees, and eating leaves, buds, fruits, and occasionally small birds, mammals, and insects; they keep concealed during the day on the branches or in the hollows of trees, quitting their hiding places at twilight; they are rather sluggish, except such as are provided with a flying membrane.

The head is moderate, the face short, the upper lip cleft, and the muffle naked; limbs equal in length, all five-toed, the anterior with compressed and curved claws, the posterior with the inner toe large, nailless, at right angles and opposable to the rest; the tail long, and generally prehensile; the pouch well developed; the eyes large; the stomach simple, and the cæcum largely developed. Of the genera composing this family, *phascolarctos* (De Blainv.) has been noticed under KOALA; the others are *phalangista* (Cuv.) and *petaurus* (Shaw).—In *phalangista* the teeth are: incisors $\frac{6}{2}$, canines $\frac{1-1}{0-0}$, premolars $\frac{2-2}{1-1}$, true molars $\frac{4-4}{4-4}$; the anterior upper pair of incisors are larger and longer than the rest, and the large lower incisors are nearly horizontal; the small teeth between the incisors and molars are not constant even on both sides of the jaws of the same individual, but in most the true molars are $\frac{4-4}{4-4}$; the tail is prehensile. The genus has been subdivided into four subgenera, *cuscus*, *trichosurus*, *pseudochirus*, and *dromicia*. They are about the size of a domestic cat, and are confined to the islands of the Indian and Australian archipelagoes. The ursine phalanger (*P.* [*C.*] *ursina*, Temm.) is of a general black color, freckled with yellow, under parts dirty yellow, and iris orange red; it is about 20 in. to the root of the tail, the latter being 19 in.; they live in thick woods; the very fat flesh of this, as of other species, is much relished by the natives, and the teeth are used as ornaments; some of the species emit a fetid odor from the anal glands. The vulpine phalanger (*P.* [*T.*] *vulpina*, Desm.) is of a general grayish color, yellowish white below, with the muzzle and chin blackish, the feet tinged with brown, the tail bushy and black except at the base, and an oblong rusty patch on the chest; it is as large as a cat, with long, pointed, fox-like ears and nose, and numerous long black moustaches; in captivity it usually sleeps in the daytime, and takes its food between the hands like a squirrel; the prehensile tail assists it in climbing. Specimens of these, and of several other species, have been seen living at the London zoölogical gardens.—The genus *petaurus* includes the flying phalangers, which have a membrane extended from the fore to the hind legs; the tail is very long, and well clothed with hair; they resemble flying squirrels in appearance and habits. The flying phalanger (*P. taguanoides*, Desm.) has broad, short, and rounded ears, densely hairy externally; the membrane extends to the elbow; the tail is cylindrical, longer than the head and body; fur long and soft; general color above brownish black, pencilled with whitish on the flanks, the under parts impure white, and the tail black; the length of the body is 20 in., and of the tail 22 in. It inhabits New South Wales, is nocturnal, and feeds on flowers of gum trees, and on insects and honey contained therein; it is an expert climber, and rarely descends to the ground. Some of the smaller species, as the sugar or Norfolk island flying squirrel (*P. sciureus*, Desm.), are hunted for their fur, which is used for the same purposes as chinchilla. In flying powers they are equal to the flying squirrels.—For other genera and species, and full details, see vol. i. of Waterhouse's "Natural History of the Mammalia."



Vulpine Phalanger (Phalangista vulpina).

Flying Phalanger (Petaurus taguanoides).

PHALARIS, tyrant of Agrigentum in Sicily, from about 570 to about 555 B. C. He was a native of Agrigentum, or, less probably, of Astypalæa in the Ægean sea. The means by which he acquired the supreme power are doubtful, one legend attributing his elevation to a stratagem by which he forcibly gained control of the city; others to a sudden usurpation, like a modern *coup d'état*, made while he held one of the higher offices. The early part of his reign was mild, but he afterward pursued a career of cruelty and oppression. It is related that Perillus, an Athenian artist, constructed for him a brazen bull in which his victims were roasted, and the first sufferer by the machine was the maker himself. His misgovernment at last caused a popular outbreak, in which he was stoned to death. The "Epistles of Phalaris," first published at Venice in 1498, were proved by Bentley to be spurious.

PHALAROPE, a family of wading birds, coming near the snipes, embracing the genus *phalaropus* (Briss.), subdivided into three by modern naturalists. In this family the bill is as long as or longer than the head, slender, straight, somewhat enlarged and depressed at the tip, which is curved and acute, the nostrils situated in the lengthened groove of the sides; wings long and pointed, the first and second quills equal and longest; tail short and rounded; tarsi as long as the middle toe, strong and compressed; toes long, the lateral united to the middle by a membrane running along the border of each, and more or less lobed as in the coot; hind toe moderate and elevated, and slightly margined with membrane; claws short and sharp; feathers of the breast compact and duck-like. These birds live in the northern regions, migrating south in severe winters; they are generally seen in pairs or small parties, swimming on the sea, lakes, ponds, and fresh-water streams, usually near the margin, searching for floating seeds, aquatic insects, and small crustaceans; large beds of floating seaweed are their favorite resorts; they are excellent swimmers, though they do not dive, and high and rapid fliers; they lay three or four eggs in a tuft of grass in marshes. Wilson's or the gray phalarope (*P. Wilsonii*, Sab.; genus *steganopus*, Vieill.) is about 9½ in. long, with an alar extent of 17 in.; the bill 1⅛ in., black; general color above ashy gray mixed with reddish; stripe behind eye reddish black; front of neck reddish brown; rump and upper tail coverts and under parts white; the young are cinereous above, mixed with dark brown, and ashy white below. It is found throughout the temperate regions of North and South America, on the Atlantic and Pacific coasts, and sometimes wanders to Europe; it is fond of wading as it searches for food, and is lively and graceful; the marginal membrane of the toes is nearly even. The northern phalarope (*P. hyperboreus*, Temm.; genus *lobipes*, Cuv.) is about 7 in. long, with an alar extent of 14 in. and the bill 1 in.; the webs are scalloped at the joints. The general color above is brownish black, paler on the rump, and mixed with ferruginous on the back; head and neck behind sooty ash, and the latter encircled with a ring of bright ferruginous, with a stripe of the same on each side; tips of greater wing coverts white; sides ashy mixed with reddish, and under parts white; the young are brownish black above, many feathers with ashy or yellowish tips. This species is found in the temperate parts of North America, and is widely distributed over N. Europe and Asia; it is one of the handsomest and most graceful of the waders. They congregate in flocks, and are very shy; they breed in the north, both sexes incubating, the female having, it is said, a bare space on the abdomen where it comes in contact with the eggs; the eggs are 1¼ by ⅞ in., of a buff color with dark reddish brown blotches. They have been seen on floating seaweed more than 100 miles from shore. The red phalarope (*P. fulicarius*, Bonap.) is 7⅛ in. long and 14 in. in alar extent; the bill is strong and flattened, widened at the end; the head above, throat, and back brownish black, on the last edged with pale ochrey yellow; wings and tail ashy brown; tips of greater wing coverts, and stripe on cheek, white; under parts deep brownish red, tinged with purplish on the abdomen; under wing coverts and axillaries white; bill greenish yellow; the young are light cinereous above, mixed with blackish brown on the head and wings, and white below. It is found in temperate America, Asia, and Europe, and is considered excellent eating in autumn; the eggs are 1¼ by ⅞ in., dull greenish yellow with blotches and dots of reddish brown.

Wilson's Phalarope (Phalaropus Wilsonii).

PHALERUM. See ATHENS, vol. ii., p. 59.

PHALLIC WORSHIP, the adoration of the generative organs as symbols of the creative power of nature. In early ages the sexual emblems were adored as most sacred objects, and in the several polytheistic systems the act or principle of which the phallus was the type was represented by a deity, to whom it was consecrated: in Egypt by Khem, in India by Siva, in Assyria by Vul, in primitive Greece by Pan and later by Priapus, in Italy by Mutinus or Priapus, among the Teutonic and Scandinavian nations by Fricco, and in Spain by Hortanes. Phallic monuments and sculptured emblems are found in all parts of the world. In the cave temples of Elephanta, Salsette, and Ellora, and other sanctuaries of Siva, the *lingam* or phallus, frequently in conjunction with the *yohni* or *cteis* (κτεíς), its counterpart, is everywhere prominent. In Egypt it is sculptured on the walls of temples or erected in the form of obelisks before them. The *crux ansata*, so common on Egyptian monuments, symbolizes the union of the active and passive principles of nature. In the Etruscan tombs have been found crosses formed of four phalli. (See CROSS.) The two obelisks before the temple at Hierapolis represented phalli, as did many of the stone pillars of whose erection we have historic record. The columns set up by Sesostris to commemorate his victories are said to have borne phallic emblems. The Spanish conquerors of America found phallic symbols in Mexico, Central America, and Peru. In Pánuco the phallus was adored in the temples, and in Tlascala were worshipped both the phallus and the cteis. In the court of the great temple of Cuzco, and in front of the temples of Yucatan, stood phallic pillars; and many monuments, the object of whose building is lost in antiquity, such as the round towers of Ireland, druidical stones, &c., are believed by some to have a similar significance. Phallic processions and observances are said by Herodotus to have been introduced from Egypt into Greece by Melampus. In the former country the phallus of the bull Apis was carried in procession during the festivals of Osiris by women, to the music of flutes. In Greece the emblem was used in the festivals of Bacchus, Aphrodite, Demeter, and Apollo, and was borne openly in processions by bearers called *φαλλοφόροι* to the music of phallic songs. According to St. Augustine, the phallus was consecrated in Rome in the temples of Liber, and the cteis in those of Libera. At the festivals of Venus the Roman matrons adored the emblem in her temple on the Quirinal, and bore it thence with great pomp to the sanctuary of Venus Erycina, outside the Colline gate, where it was presented to the statue of the goddess and then returned to the former place. In the spring the Roman rustics carried the phallus across the fields, to insure fertility. These processions were finally suppressed by the Roman senate, on account of the immorality which sprung from them.—A secondary phase of phallism was the use of the emblem as a *fascinum* or charm against evil influences. With this object it was put over gateways and doors, just as the horse shoe is by the superstitious of the present day, and hung around the necks of children as a preventive against witchcraft. It was also worn by barren women in the belief that it would conduce to fruitfulness. For a like purpose votive offerings of phalli were often made in the temples. Great numbers of small ones in bronze and porcelain have been found at Pompeii and Herculaneum and in the Egyptian tombs. In the 9th century the use of the phallus as an amulet or charm was so general that it was anathematized by the church, and the anathema was repeated in the 13th and 14th centuries; but to this day, in some parts of Italy, the peasants still hang the emblem on the necks of their infants to protect them from the evil eye.—Phallic worship still prevails in the East. In the temples of Siva the phallus, crowned with flowers and surmounted by a golden star, is exposed in the sanctuary, and lamps are kept burning before it. The devotees of Siva wear small images of the emblem, made of gold, ivory, or crystal, as ornaments, and they are often buried with them. Offerings of phalli are still made in the Buddhist temples of China by barren women, just as they were by Roman wives in the temples of Venus.—See "A Discourse on the Worship of Priapus," by Richard Payne Knight (4to, London, 1786; new ed., 1871), and "Ancient Symbol Worship," by H. M. Westropp and C. S. Wake (New York, 1874).

PHANARIOTES. See Fanariotes.

PHARAOH, the Egyptian word for king, applied particularly to the native rulers of Egypt before the Persian conquest. The title is derived by Rosellini, Lepsius, Chabas, and others from the Egyptian *ph-Ra*, the sun. It denoted that the king was an emblem of the god of light, and derived his authority directly from heaven. The name is found in the hieroglyphics, as the regular royal prænomen, expressed by a ring or disk, the character representing the sun. De Rougé and Ebers, however, read the word *pe-raa*, meaning "grand house," and consider it a title corresponding to the modern "Sublime Porte." In the Old Testament Pharaoh is generally used without the addition of the individual name of the king, Pharaoh Necho and Pharaoh Hophra being the only exceptions.

PHARISEES (generally derived from Heb. *perushim*, the separated), a sect of the Jews, mentioned first by Josephus as an established religious party during the priesthood of Jonathan, about 150 B. C. They are generally considered essentially the same with the Assideans (Heb. *'hasidim*), mentioned in the books of the Maccabees, who took their rise as a party in the resolute determination to resist the adoption of Grecian customs under Antiochus Epiphanes. Their name probably indicated their separation from the rest of the Jews by the assumed holiness of their lives and their strict observance of religious ceremonies. In the time of Christ they were divided into two schools, that of Hillel, who represented a moderate Pharisaism and laid the foundation of the Talmud, and that of Shammai, who demanded more austere observance. The former finally prevailed. Our knowledge of them is derived from Josephus, himself a Pharisee, the New Testament, especially the writings and speeches of the apostle Paul, and the Mishnah. They maintained that besides the written law of God there was an oral law handed down by tradition to explain it. This oral law consisted of unwritten supplementary instructions, given directly by God to Moses, opinions decided by the majority of the elders, decrees made by prophets and wise men in different ages, and legal decisions of proper ecclesiastical authority on disputed questions. The authority of this oral law was rejected by the opponents of the Pharisees, the Sadducees, who clung to the literal meaning of the Mosaic law. The Pharisees, unlike their Sadducee opponents, believed in the immortality of the soul, in rewards and punishments beyond the grave, and in resurrection. Their enthusiasm for traditional observances and national manners and customs gave them great influence among the people, while the Asmonean princes and their adherents generally sided with the Hellenizing Sadducees. Josephus says: "The Sadducees are able to persuade none but the rich, and have not the populace obsequious to them; but the Pharisees have the multitude on their side." In the New Testament the Pharisee opponents of the Christian teachings appear in a very unfavorable light, being represented as proud, hypocritical, and intolerant.—See Biedermann, *Pharisäer und Sadducäer* (1854); Geiger, *Urschrift*, &c. (1857), and *Sadducäer und Pharisäer* (1863); Delitzsch, *Jesus und Hillel* (1866); and Wellhausen, *Die Pharisäer und die Sadducäer* (1874).

PHARO. See FARO.

PHAROS, the ancient name of a small island off the coast of Egypt, seven stadia from the ancient Alexandria, connected with the mainland by a mole, and famous for its lighthouse, which was numbered among the seven wonders of the world, and gave the name of Pharos to all structures of a similar kind. (See LIGHTHOUSE, vol. x., p. 458.) The island became at length a suburb of Alexandria by means of a street running along the mole, and retained some importance even to the time of Julius Cæsar, but subsequently sank into its original condition of a fishing station.

PHARSALUS (now *Phersala*), a city of Thessaly, in Thessaliotis, near the left bank of the Enipeus, and at the foot of Mt. Narthacius. In 455 B. C. it was unsuccessfully besieged by the Athenian general Myronides. It was for a time in the possession of Antiochus the Great, but was taken by the Roman consul Glabrio in 191. In the time of Pliny Pharsalus was a free state. The ancient city was nearly 4 m. in circuit, and situated on an eminence which was 600 or 700 ft. high, and on three sides was defended by precipices. Leake calls it one of the most important military positions in Greece.—Pharsalus is chiefly celebrated for the battle fought in its territory (called Pharsalia) on Aug. 9, 48 B. C., between Cæsar and Pompey. The army of the former, consisting of 22,000 foot and 1,000 horse, was posted on the plain between Pharsalus and the Enipeus; that of the latter, consisting of 45,000 foot and 7,000 horse, was drawn up opposite. Pompey expected with his body of cavalry to turn Cæsar's right wing, and thus gain the victory; but his cavalry were unexpectedly assailed by six cohorts of infantry, which Cæsar, suspecting the design of the enemy, had stationed on the right as a reserve force. Pompey's cavalry were put to flight, and, the six cohorts turning his left wing, his troops gave way in every direction. After the rout became general Pompey fled. His camp was stormed about the middle of the day, and the victory was completed by the surrender of four legions, which Cæsar took prisoners about nightfall. This battle decided the fate of the Roman world.

PHARYNX, that part of the alimentary canal situated behind and below the mouth and above the œsophagus, with which it is continuous. It is a musculo-membranous sac, conical or pyriform, with its base upward, and extends from the base of the skull to the cricoid cartilage in front and the fifth cervical vertebra behind, being about 4½ in. long in the adult human subject. Its transverse is greater than its antero-posterior diameter. It is connected behind by loose areolar tissues with the cervical portion of the vertebral column, and some of the muscles of the neck situated there. Seven openings communicate with it: the two posterior nares (nasal passages), the two Eustachian tubes, the mouth, the larynx, and the œsophagus. The Eustachian tubes open on each side of the upper part of the pharynx and communicate with the cavity of the middle ear. (See EAR.) The pharynx is placed behind the larynx, as the œsophagus is behind the trachea or windpipe; and the glottis or opening into the larynx, which in swallowing is closed by the valvular epiglottis, is in the front side of the pharynx, and looks backward into its cavity. It is divided from the cavity of the mouth by the *velum palati*, or soft palate. (See PALATE.) The pharynx has three coats: a mucous or lining coat, next to it a middle or fibrous coat, and beneath this the muscular coat. The mucous coat is continuous with that of the mouth and adjacent passages. The fibrous coat, called the pharyngeal aponeurosis, is thick above, where the muscular fibres are wanting, and is firmly connected with the occipital and temporal bones of the skull. As it descends it gradually diminishes in thickness until it disappears. The muscular coat is composed of five pairs of muscles, viz., three constrictors and two elevators. The constrictors, called superior, middle, and inferior, have their fibres directed transversely downward around the pharynx, being mostly united in a continuous *raphe* or suture behind, but attached to different and separated points in front, most of the fibres of the superior constrictor being inserted into the palate and sphenoid bones, the lower jaw bone, the root of the tongue, and some other muscles and ligaments. The middle constrictor is principally inserted into the

Pharyngeal Muscles.

hyoid bone, at the root of the tongue. The fibres of the inferior constrictor are mostly united in front to the thyroid and cricoid cartilages. The elevator muscles rise from points at the base of the skull, and, passing nearly vertically downward, have most of their fibres inserted into the posterior border of the thyroid cartilage. From this description the action of these muscles, as far as the pharynx is connected with the function of deglutition or swallowing, will be apparent. When a portion of food is about to be swallowed, the pharynx is drawn upward and dilated to receive it, the elevator muscles drawing the sides outward as well as upward. As soon as the food is thrown into the cavity by the action of the tongue, the elevators relax, and the constrictors, beginning above, contract successively and propel the food downward into the œsophagus, which transmits it to the stomach. Besides its action in deglutition, the pharynx exerts an important influence in modulating the voice by the different dimensions it is capable of assuming. It is well supplied with mucous glands. Follicular glands are spread over its whole extent beneath the mucous membrane, and across the upper part is a thick layer of racemose glands, all of which, especially during mastication and deglutition, pour out an abundant secretion of lubricating mucus.—The pharynx is liable to be attacked by inflammation (pharyngitis), and is one of the common seats of exudation in diphtheria. Its mucous membrane is often the seat of common catarrh, like that which lines the respiratory passages. In scarlet fever, measles, and other exanthematous diseases, it has a specific inflammation.

PHASCOGALE, or **Pouched Mouse,** a genus of small marsupial mammals of the *dasyurus* family, inhabiting Australia and Tasmania. The dental formula is: incisors $\frac{8}{6}$, the two anterior in each jaw larger than the others, canines $\frac{1-1}{1-1}$, premolars $\frac{3-3}{3-3}$, true molars $\frac{4-4}{4-4}$, studded with prickly tubercles. All the feet are five-toed, the inner one on the hind feet a small, nailless, prehensile thumb; tail either wholly clothed with short hairs, or with long and bushy ones on the apical portion; the females are sometimes destitute of a pouch, the young being protected only by the hair of the abdomen; mammæ eight, arranged in a circle. The cranial cavity and occipital opening are comparatively large, and the muscular ridges of the skull and the cervical spinous processes feebly developed; the muzzle pointed and moderately long, muffle naked, nostrils lateral, ears moderate, and limbs short; they are insectivorous, and climb trees in search of food. The largest species is the brush-tailed phascogale (*P. penicillata*, Temm.), about the size of a common rat, 18 in. long, of which the tail is one half; the fur is long and soft, gray pencilled with white, below white, the middle part of the head dusky, and the tail bushy, with long black hairs except on the basal third, where they are short and gray; it is widely distributed in Australia; it makes a nest in the hollows of trees, and is accused of attacking the poultry and plundering the stores of the settlers. Several other species are described by Waterhouse in "Natural History of the Mammalia," vol. i.

Brush-tailed Phascogale (Phascogale penicillata).

PHASIS, the ancient name of the Rion or Faz, a river of western Asia, in Transcaucasia, which rises at the foot of Mt. Pasmta in the western division of the Caucasus, flows S. W. and W. for about 50 m., S. for more than 40 m., and W. for about 60 m., and enters the Black sea about lat. 42° 10′ N., lon. 41° 40′ E. It receives in succession the Kvirila, the Tzkhate, and the Tekhur, besides several smaller streams. It is navigable in its lower course, and forms an important transport facility for Kutais and other inland towns. The railway from Tiflis to the sea follows the lower (westerly) portion of its course. Its width at Kutais varies from about 125 (in very hot summers) to nearly 1,000 ft. The Phasis was an important river in the ancient world, being considered by the oldest geographers the boundary between Europe and Asia, and by later classical writers between Asia Minor and Colchis, of which latter country it was the principal stream. The three affluents named above seem to be respectively the Rhium, the Hippius, and (probably) the Glaucus of the ancients, and the modern Kutais was their Cytæa or Cutatisium. The legend of the Argonauts represents them as landing at the mouth of the Phasis.—The town of Phasis was a well known ancient trading port, founded and strongly fortified by the Milesians a little south of the river's mouth, near the modern Poti.—Our word pheasant (the *avis Phasiana* of the Romans) is derived from the supposed origin of that bird in the neighborhood of the Phasis.

PHAULCON. See Constantin Faulcon.

PHEASANT, an extensive family of gallinaceous birds, comprising the subfamilies *pavoninæ* or peacocks, *gallinæ* or jungle fowls, *phasianinæ* or pheasants proper, *lophophorinæ* or

Common Pheasant (Phasianus Colchicus).

monauls, and *meleagrinæ* or turkeys. Of these, the first and most of the second have been described; the fifth will be found under TURKEY; and only the third, fourth, and a part of the second will be noticed here. The family includes the handsomest of the rasorial birds, and is for the most part confined to Asia and its islands; the Guinea fowl, however, is African, and the turkeys are American; the latter, with the common fowl and the peacock, have been completely domesticated, and are distributed very generally over the globe. The head is rarely feathered all over, but more or less about the eyes and often a considerable part of the neck are bare, and furnished with crests, wattles, and combs of singular forms.—In the *phasianinæ* may be included the genera *phasianus* (Linn.), *thaumalea* (Wagl.), and *argus* (Temm.). In *phasianus* the bill is moderate, strong, vaulted and slightly arched at the tip, which overhangs the lower mandible; the nostrils in a lateral groove and partly closed by membrane; the wings short and rounded, the fourth and fifth quills the longest; tail lengthened, wedge-shaped, with each feather attenuated; tarsi robust, covered in front with divided scales, and in the males armed with a strong spur; toes strong, united at the base by a membrane, the hind toe short and elevated, and the claws stout and slightly curved. The few species described are naturally inhabitants of the mountainous regions of Asia, but some have been naturalized in temperate Europe; they frequent thick jungles, the sexes keeping separate except in the breeding season, when they form families of a single male and several females, each with their special locality, from which all intruders are expelled. They are rapid runners, and fly rapidly and noisily for short distances; the food consists of grains, seeds, bulbs, and insects, which they seek usually toward sunset; they roost in trees in the cold season; the eggs are 10 or 12, and are laid generally on the ground, with very little if any nest. The common pheasant (*P. Colchicus*, Linn.) is about 3 ft. long, of which the tail is nearly half; the male is bright rufous above, the head and neck blue with green and golden reflections, and variegated with black and white; the cheeks bare and red, the sides and lower parts purplish chestnut; tail with transverse black bands; the female is smaller, brownish gray, varied with reddish and dusky. This bird is supposed to have been introduced from the banks of the Phasis, a river of ancient Colchis, on the E. coast of the Black sea, whence its scientific name; it is generally distributed over S. Europe, but in the northern parts requires protection by stringent game laws to prevent its extinction; it could probably be introduced with advantage into the temperate parts of America. Its habits are much like those of the common fowl; it breeds in confinement, but is apt to neglect its eggs, which are therefore usually placed under a common hen; it will breed with the common and Guinea fowls, in the wild state with the ring-necked species, and, it is said, also with the black grouse. A breed called the ring-necked pheasant has a white ring around the neck, and is either a mere variety, or a hybrid with the *P. torquatus* (Gmel.) of China. Pheasant shooting is a famous pastime in Europe, and great numbers are killed at battues; they are special favorites with poachers; the flesh is excellent. In confinement they are subject to an epidemic and often fatal disease, called the "gapes," caused by a nematoid strongyloid parasitic worm (*sclerostomum syngamus*, Dies.), which produces inflammatory swelling of the windpipe, and frequently suffocation; the best remedy is fumigation with tobacco carried to stupefaction. There are other more beautiful species in Japan and northern Asia.—The genus *thaumalea* differs from the last in having the head furnished with a crest of long slender feathers, and a kind of tippet of lengthened feathers around the back of the neck. The golden pheasant (*T. picta*, Wagl.) is perhaps the most gaudy of the family, the brilliancy and variety of its plumage being beyond description; it is well known in aviaries and collections; the general color is golden yellow above, scarlet below, with yellow crest, green back, brown hood, and blue secondaries; it is about the size of the common pheasant, but the tail is longer; as usual in the family, the female has a plain brownish plumage. It is a hardy bird, a native of China, kept in domestication, and highly prized for the table.—In the genus *argus* the seventh and eighth quills of the wings are the longest, with the secondaries remarkably prolonged; the tail is long and compressed, with the two middle feathers much elongated; the tarsi long and slender, without spurs; head and neck covered only with scattered hairs. The argus pheasant (*A. giganteus*, Temm.) is about the size of a common fowl, but the two middle tail feathers are 3½ or 4 ft. long; the under parts and lower neck are reddish brown spotted with yellow and black; the back ochrey yellow, with black and brown spots; tail deep chestnut with white spots surrounded by a black

Golden Pheasant (Thaumalea picta).

ring; secondaries about 3 ft. long, brownish, but when spread adorned with beautiful ocellated spots like those in the peacock's tail; the female is dull chestnut red, varied with yellowish brown and black, without the development of the tail feathers and secondaries. It is found in the dense forests of Sumatra and the other large East Indian islands, where it lives in pairs. The long secondaries, which render flight difficult, are of great service to the bird when running, acting in the manner of sails; these feathers, with those of other brilliant gallinaceous birds, are exported from Batavia as ornaments for dresses, screens, fans, and similar objects. This bird does not thrive in confinement.—In the subfamily *gallinæ* should be mentioned here the genus *gallophasis* (Hodgs.) or *euplocomus* (Temm.), in which the wings are moderate and much rounded, with the fourth to the seventh quills nearly equal and longest, and the secondaries ample and broad; tail and its coverts ample, with compressed sides, arched or straight, and sometimes forked; tarsi long, strong, and armed with a large spur; the sides of the head bare, with wattles at the base of the lower mandible, and sometimes a crest. They inhabit the primeval forests of India and its islands, preferring the close covers of mountainous districts; they are usually seen in parties of eight or ten, which run rapidly among the brushwood when alarmed. The silver pheasant (*G. nycthemerus*, Hodgs.) has the throat, under parts, and ample crest glossy purplish black, the feathers being generally lanceolate; the rest of the plumage pure white, the webs of the feathers of the back diagonally streaked with black; legs and feet purple lake, and large, naked, velvety space about the eyes bright vermilion. It is a powerful bird, and a match for a game cock; it is a native of northern China, where it is often kept in a tame state; being very hardy, it is frequently carried to Europe, and, with the golden pheasant, forms a pleasing addition to aviaries. About a dozen other species are described. The genus *ceriornis* (Swains.) includes the brilliant tragopans. (See TRAGOPAN.)—

Argus Pheasant (Argus giganteus).

Impeyan Pheasant (Lophophorus Impeyanus).

In the subfamily *lophophorinæ* belong some very remarkable pheasants. The genus *lophophorus* (Temm.) has the upper mandible very much curved over the lower, the fourth and fifth quills longest, tail ample and rounded, and tarsi armed with a short spur. The Impeyan pheasant (*L. Impeyanus*, Vieill.) is about 2 ft. long; the colors of the plumage defy description or representation, being resplendent with ever changing hues of green, steel-blue, violet, golden, and bronze, dense and metallic in appearance, but soft and velvety to the touch; the middle of the back pure white, and the tail bright chestnut with transverse bars of a duller tint; on the head is a crest of feathers with naked shafts and oval tip of metallic hue; the female is smaller, of a general reddish brown, mottled with spots and bars, with throat and fore neck white. This species, named in honor of Lady Impey, inhabits Nepaul and the Himalaya mountains.

PHELPS. **I.** A S. central county of Nebraska, bounded N. by the Platte river; area, about 550 sq. m. It has been recently formed, and is not included in the census of 1870. **II.** A S. E. county of Missouri, drained by the Gasconade and Maramec rivers; area, about 600 sq. m.; pop. in 1870, 10,506, of whom 294 were colored. The surface is undulating and the soil fertile. There are many low valleys between steep and broken slopes. It is traversed by the Atlantic and Pacific railroad. The chief productions in 1870 were 70,187 bushels of wheat, 239,504 of Indian corn, 62,510 of oats, 23,121 of potatoes, 82,548 lbs. of tobacco, and 2,816 tons of hay. There were 2,219 horses, 2,291 milch cows, 5,351 other cattle, 8,913 sheep, and 15,051 swine; 2 manufactories of carriages and wagons, 3 of iron, 1 of woollens, 5 flour mills, and 2 saw mills. Capital, Rolla.

PHELPS, Almira Hart Lincoln, an American teacher, born in Berlin, Conn., in 1793. At the age of 19 she taught school at her father's house, and not long afterward took charge of the Sandy Hill (N. Y.) female academy. In 1817 she was married to Simeon Lincoln of Hartford, then editor of the "Connecticut Mirror." He died in 1823, and soon afterward she became associated with her sister Mrs. Emma Willard in the direction of the female seminary at Troy, N. Y., where she continued till 1831, when she was married to the Hon. John Phelps of Vermont. In 1838 she took charge of a seminary at West Chester, Pa., and afterward taught in Rahway, N. J. In 1841, on the invitation of the bishop of Maryland, Mr. and Mrs. Phelps took charge of the Patapsco institute, a diocesan female school, which soon attained a high reputation; and after the death of Mr. Phelps in 1848 Mrs. Phelps conducted it alone till 1856, when she resigned. She has published "Familiar Lectures on Botany" (Hartford, 1829; last revised ed., 1865); "Dictionary of Chemistry" (New York, 1830); "Botany for Beginners" (Hartford, 1831; last ed., Philadelphia, 1867); "Geology for Beginners" (Brattleboro, 1832); "Female Student, or Fireside Friend" (Boston, 1833; London, 1838); "Caroline Westerly" (New York, 1833); "Chemistry for Beginners" (New York, 1834; last ed., Philadelphia, 1865); "Lectures on Natural Philosophy" (New York, 1835; enlarged ed., 1854); "Lectures on Chemistry" (New York, 1837; revised ed., Philadelphia, 1865); "Natural Philosophy for Beginners" (New York, 1837; last ed., Philadelphia, 1865); "Ida Norman" (Baltimore, 1850); "Hours with my Pupils" (New York, 1859); and "Christian Households" (1860 and 1869). She also edited "Our Country in its Relations to the Past, Present, and Future" (Baltimore, 1864), for the benefit of the Christian and sanitary commissions.

PHELPS, Anson Greene, an American merchant, born in Simsbury, Conn., in March, 1781, died in New York, Nov. 30, 1853. He learned the trade of a saddler, and established himself in Hartford, with a branch business in Charleston, S. C. In 1815 he engaged in New York city as a dealer in tin plate and heavy metals. Having accumulated a large fortune partly by investments in real estate, he devoted himself to benevolent enterprises, and was president of the New York blind asylum, the American board of commissioners for foreign missions, and the New York branch of the colonization society. He bequeathed to charitable institutions sums amounting to $371,000, and placed in the hands of his only son a fund of $100,000, the interest to be distributed in charity at his son's discretion. In addition to large legacies to 24 grandchildren, he intrusted to each $5,000 for charitable purposes.

PHELPS. I. Austin, an American clergyman, born in West Brookfield, Mass., Jan. 7, 1820. He graduated at the university of Pennsylvania in 1837, and in 1842 was ordained pastor of the Pine street Congregational church in Boston. Since 1848 he has been professor of sacred rhetoric in the Andover theological seminary. He has published "The Still Hour" (16mo, 1859), "The New Birth" (12mo, 1866), and "The Solitude of Christ" (12mo, 1868), and contributed a critical treatise on the history of hymnology to "Hymns and Choirs" (12mo, Andover, 1860). **II. Elizabeth Stuart,** an American authoress, wife of the preceding, born in Andover, Mass., Aug. 13, 1815, died in Boston, Nov. 30, 1852. She was the daughter of Prof. Moses Stuart of Andover, and was married to Mr. Phelps in 1842. She published many Sunday school books anonymously, or under the pseudonyme of "H. Trusta," an anagram on her name. "The Sunny Side" (18mo, Andover), published in 1851, after being rejected by several publishers, reached a sale of more than 100,000 copies, and was republished in Edinburgh. It illustrated the experiences of a country minister, and was followed by "A Peep at Number Five" (1851), describing a city pastor's life, which was also very popular. She also published the "Kitty Brown" series (4 vols. 18mo, Philadelphia, 1850), and "The Angel over the Right Shoulder" (Andover, 1851). After her death appeared "The Telltale" (1852), "Little Mary" (Boston, 1853), and "The Last Leaf from Sunny Side, with a Memorial of the Author by Rev. Austin Phelps" (1853). **III. Elizabeth Stuart,** an American authoress, daughter of the preceding, born in Andover, Mass., Aug. 31, 1844. She has published "Ellen's Idol" (18mo, Boston, 1864); "Up Hill" (1865); the "Tiny" series (4 vols. 18mo, 1866–'9); "Mercy Glidden's Work" (1866); the "Gypsy" series (4 vols., 1866–'9); "I Don't Know How" (1867); "The Gates Ajar" (1868), a book on death and bereavement, which reached a 20th edition within a year; "Men, Women, and Ghosts" (1869); "Hedged In" (1870), intended to exhibit the ideal of Christian treatment of fallen women; "The Silent Partner" (1870); and "Poetic Studies" (1875).

PHENOL, or **Phenic Acid.** See CARBOLIC ACID.

PHERÆ, a city of ancient Thessaly, near the S. E. limits of Pelasgiotis, about 10 m. W. of its port Pagasæ on the Pagasæan gulf (the modern gulf of Volo). Its site is that of the modern Velestino, where its ancient walls may still be traced. It is spoken of as governed by an aristocracy at the beginning of the Peloponnesian war (in which it aided Athens), and it was even then one of the most powerful of the Thessalian towns. In the latter part of the war, however, Lycophron became tyrant of the place, and under his son Jason Pheræ was the leading power of Thessaly. Jason became tagus or chief general of the whole country about 374 B. C., and ruled for four years, when he was assassinated, and succeeded by his brother Polydorus, who in turn was poisoned by another brother, either Alexander or Polyphron. Alexander, the most famous of the tyrants of Pheræ, appears to have succeeded one or the other of his murdered brothers in 369. His tyranny excited the opposition of the Thessalian states, and they applied to Alexander, king of Macedon (son of Amyntas II.), for aid against him. The Macedonian penetrated to Larissa, where he left a garrison and retired. Left thus exposed, the Thessalians next applied successfully to Thebes, which sent Pelopidas to negotiate. Alexander at first showed a disposition to yield, but, finding Pelopidas hostile to him personally, kept beyond his reach, and on his repeating his visit of negotiation in the next year (368) entrapped and imprisoned him, afterward defeating the Theban army sent to his rescue. A second Theban incursion under Epaminondas compelled him, however, to give up the prisoner. The next few years were marked by renewed acts of cruelty in Thessaly, and about 364 the Thebans again came to the aid of the oppressed states, defeating Alexander at Cynoscephalæ, where Pelopidas fell, and again a little later, compelling him to resign all pretensions except those to Pheræ. In 362 he attacked several Athenian dependencies, and landed troops in Attica, but was promptly defeated, though he succeeded in withdrawing his troops, and in plundering Piræus. Alexander was murdered about 359 by the connivance of his wife Thebe, and was succeeded by the latter's brothers till 352, when Philip of Macedon became the controlling power in Thessaly. Pheræ fell into the hands of Antiochus the Great of Syria in 191, and soon after was captured by the Romans under Glabrio. The city appears to have been unusually prosperous and beautiful, the celebrated fountain of Hyperia supplying it with much water, and the neighborhood being very fertile.

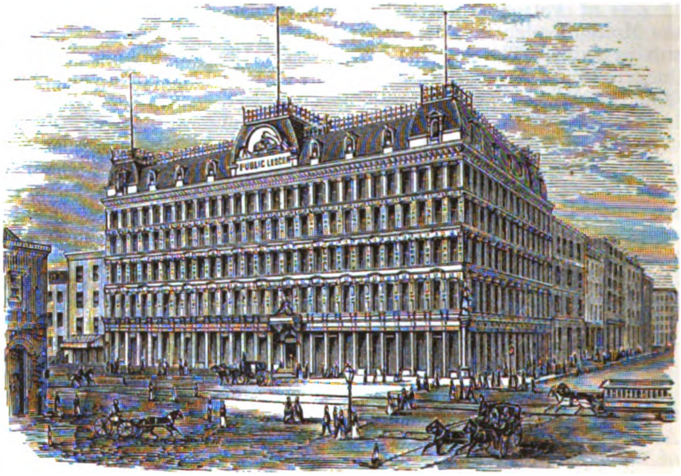
PHERECYDES. I. A Greek philosopher of Syros, said to have been the teacher of Pythagoras, flourished about 540 B. C. He maintained that there were three principia, Zeus or Æther, Chthon or Earth, and Cronos or Time, and four elements, fire, air, earth, and water; and that all things sprang from these. His distinguishing doctrine was that of metempsychosis, or according to others that of the immortality of the soul. The fragments of Pherecydes were printed by August Wolf in the first part of his *Literarische Analekten* (Berlin, 1817). **II.** A Greek logographer, about 480 B. C., called Pherecydes of Leros, his birthplace, or of Athens, where he passed most of his life. Fragments of his work on the genealogy of the gods and heroes have been collected.

PHIDIAS, a Greek sculptor, born in Athens, probably between 490 and 488 B. C., died there about 432. The dates of the most important events in his career can only be approximately ascertained. He is supposed to have belonged to a family of artists, and is said to have originally occupied himself with painting. He was instructed in sculpture by two native artists, Hegesias and Ageladas, and probably between the ages of 25 and 30 began to exercise his calling in Athens. His subjects were for the most part sacred, and among the works attributed to him are nine statues of Athena (Minerva), the tutelary goddess of his native city. One of these, at Pellene in Achaia, was perhaps his earliest public work. About the same time he executed the group of 18 bronze statues dedicated by the Athenians at Delphi out of the tithe of their share of the spoils taken from the Persians at Marathon, and the colossal bronze statue of Athena Promachos in the Athenian acropolis, 50 or 60 ft. high, which is also said to have been made from the spoils of Marathon. Pericles made him general director of all the great works of art in progress in Athens, including the propylæa of the acropolis and the Parthenon. For the latter he executed the colossal chryselephantine or gold and ivory statue of Athena, which stood in the *prodomus* or front chamber of the temple. It was formed of plates of ivory laid upon a core of wood or stone for the flesh parts, while the drapery, the ægis, the buckler, the helmet, and other accessories were of solid gold, adorned with devices and elaborately engraved with subjects taken from Athenian legends. No expense was spared by the Athenians to make this statue worthy of the shrine in which it was enclosed; and it is said that when the sculptor intimated his desire to execute it in marble, they directed him to employ those materials which were the most costly. The weight of the gold has been estimated at between 40 and 50 talents, or about $50,000. It was removed from the statue by Lachares in the time of Demetrius Poliorcetes, about 296 B. C. Previous to the time of Phidias, colossal statues when not of bronze were acroliths, the head, hands, and feet being of marble, while the body was of wood, concealed by real drapery; and the substitution of ivory and gold for these materials is believed to have been his invention. Supposed copies of the statue are in existence, and restorations have been attempted by Quatremère de Quincy and others. The architectural sculptures in marble of the Parthenon have generally been ascribed to Phidias, but that opinion is controverted by W. W. Story, in "Blackwood's Magazine" for December, 1873. (See Elgin Marbles.) The Athena was finished in 438, and, with the Parthenon, was dedicated in the same year. Shortly afterward, at the invitation of the Eleans, Phidias commenced at Olympia the colossal chryselephantine statue of Jupiter, his masterpiece. The god was represented as seated upon a throne of cedar wood, holding in one hand an ivory and gold statue of Victory and in the other a sceptre, with his feet supported by a footstool, which, as well as every part of the throne, and its base, was elaborately adorned with gold, ivory, ebony, and gems, with enchased work and paintings, with sculptures of precious metals, and with numerous accessory groups and bass reliefs. The statue was nearly 60 ft. high, and occupied Phidias and his assistants, among whom were Colotes and Alcamenes, sculptors, and Panænus the painter, between four and five years, from 437 probably to 433. It was removed by the emperor Theodosius I. to Constantinople, where it perished by fire in A. D. 475. Restorations of it have been attempted by Quatremère de Quincy and Flaxman. On the completion of the statue Phidias returned to Athens, where a formidable party was aiming at the overthrow of Pericles. Fearing to attack the great Athenian statesman directly, his enemies sought to undermine his influence by persecuting his friends; and Phidias was accused by one Menon, a workman employed upon the Parthenon, of stealing a portion of the gold appropriated to the colossal statue of Athena. As the gold had been affixed to the statue in such a manner that it could be removed, the accusers were challenged to substantiate their charge by weighing it, which they shrank from doing. Another charge was then made against the sculptor of having introduced portraits of himself and Pericles in the bass reliefs of the shield representing the battle of the Amazons. As this act was supposed to imply a dishonor to the national religion, he was thrown into prison, where, according to Plutarch, he died. In addition to the works mentioned, Phidias executed statues of deities for Athens and other cities of Greece, including an acrolithic Athena at Platæa, and a famous chryselephantine Æsculapius at Epidaurus.

PHIGALIA, or **Phialia**, an ancient town of Arcadia, near the borders of Messenia and Elis, on the right bank of the river Neda, of which ruins still exist near the modern village of Paolitza. Its celebrity is due to the temple, built by Ictinus, on Mt. Cotylion, about 6 m. N. E. of the city, dedicated to Apollo Epicurius, and called by Pausanias the most beautiful in the Peloponnesus except that at Tegea. Its ruins were explored in 1812, and the entire sculptured frieze of the cella, known as the Phigalian marbles, was brought from it for the British museum in 1814.

PHILADELPHIA (Gr. Φιλαδέλφεια, brotherly love). I. An ancient town of Lydia, on the site of the present Ala-Shehr, 27 m. E. S. E. of Sardis. It was founded by Attalus Philadelphus of Pergamus, on the lower slopes of Mt. Tmolus (now Boz Dagh), 952 ft. above the sea. The region is volcanic and was subject to frequent earthquakes. It seems to have been the depot of the great wine district around it, and in spite of its unsafe situation it continued to flourish, as attested by the book of Revelation. The outer wall of the town is still standing, with the exception of a few small portions of which only traces remain. To the southwest, on the brow of the hill, about 400 ft. above the town, were the acropolis, theatre, and stadium. Its numerous temples gave Philadelphia in ancient times the epithet of "Little Athens," but only the ruins of a single small temple are now visible. The ground of the S. E. portion of the town is now considerably higher than formerly, and blocks of marble and numerous coins have been uncovered by digging 15 ft. below the surface. The original inhabitants seem to have been Macedonians, and they retained their national character to the time of Pliny. In the beginning of our era there appear to have been there a synagogue of Hellenizing Jews and a Christian church. (See Ala-Shehr.) II. An ancient town of Palestine, E. of the Jordan, originally Rabbath-Ammon, the chief city of the Ammonites, and now called Amman, 52 m. E. N. E. of Jerusalem. The Ammonites at first lived at peace with their neighbors, but in the time of Saul began their inroads upon the territory of the Hebrews. David's retaliatory campaigns against them resulted in the devastation of their land, and compelled them to seek refuge within the walls of their only stronghold. The siege of the town is calculated to have lasted nearly two years. The lower portion, called "the city of waters" on account of the perennial stream which rises in and still flows through it, was captured by Joab, who yielded to David the honor of storming the main citadel. Two centuries later the wall and the palaces of Rabbath-Ammon are again spoken of. In the time of Nebuchadnezzar it is mentioned as a city of great importance, with several towns in the neighborhood dependent upon it. In the 3d century B. C. Ptolemy Philadelphus bestowed upon it the name of Philadelphia, and the surrounding district was called Philadelphene, or Arabia Philadelphensis. Antiochus the Great besieged and took it in 218. Subsequently it fell into the hands of Aretas, an Arab chieftain, and from later accounts it appears to have been for a time uninhabited. Yet in the beginning of our era it was again one of the strongest cities of Peræa, and one of the cities of the Decapolis. It became very early the seat of a Christian bishop, forming one of the 19 sees of Palæstina Tertia. At the time of the Mohammedan invasion of Syria the town was in ruins. The remains of a magnificent theatre, temples, mausoleums, the citadel, and other public and private buildings still exist. In recent times the place has been visited and described by Burckhardt, Seetzen, Buckingham, Lindsay, Robinson, Hamilton, E. H. Palmer, Tyrwhitt Drake, Tristram, members of the English Palestine exploration fund, and members of the American Palestine exploration society. The last named assumed the task of triangulating the country, and making it a special field of exploration.

PHILADELPHIA, the chief city of Pennsylvania, and the second of the United States in population, coextensive with the county of the same name, situated on the Delaware river, at the mouth of the Schuylkill, 96 m. from the Atlantic ocean, 125 m. in a direct line N. E. of Washington, and 85 m. S. W. of New York; lat. of Independence hall 39° 57′ N., lon. 75° 10′ W.; greatest length N. N. E. and S. S. W. 22 m., breadth from 5 to 10 m.; area, 82,603 acres, or 129·4 sq. m. The original city was included between the Delaware on the east and the Schuylkill on the west, and Vine street on the north and South street on the south, the latter street being about 3 m. N. of the junction of the two rivers. This area, a little more than 1 m. N. and S. and 2 m. E. and W., was not enlarged till 1854, when the corporation was extended over the entire county. The densely built portion comprises about 15 sq. m. between the rivers, on either side of and including the original city. The district W. of the Schuylkill is popularly known as West Philadelphia, and there are other localities which still retain the names they bore prior to annexation. Among these may be mentioned Bridesburg, Frankford, and Holmesburg in the northeast, and Manayunk (on the left bank of the Schuylkill), Germantown, and Chestnut Hill in the northwest. The last two are chiefly noted for their fine residences, the others for their manufactures. Several small streams empty into the Delaware and Schuylkill, of which the principal are Wissahickon creek, flowing through the N. W. portion of the city and emptying into the Schuylkill below Manayunk, and Frankford creek, formed by the junction of Tacony and Wingohocking creeks, emptying into the Delaware above Bridesburg. At the junction of the Schuylkill and Delaware rivers is League island, separated from the mainland on the north by a narrow passage called the "Back channel." Above this in the Delaware are Windmill, Smith's, and Treaty islands. The surface between the rivers is in general level, with an elevation of from 30 to 300 ft. above tide. In the south, however, it falls off into alluvial flats, while in the north and in the district W. of the Schuylkill it is undulating and sometimes broken. The immediate front on the Delaware was originally a bluff of gravel 30 to 50 ft. high. It is now closely built up with lofty warehouses on narrow streets. The foundation of the city is mainly a dry, well drained gravel, making the sewerage easy and perfect. Ledges of gneiss and imperfect granite underlie the upper part of the city; Fairmount reservoir rests on a large and peculiar ledge of this sort, 96 ft. high, near the Schuylkill. The tide ascends the Delaware river above the city on the E. side, and the Schuylkill on the W. side to Fairmount dam, thus nearly surrounding it with tidal waters.—The original city was regularly laid out, the N. and S. streets, with few exceptions, being numbered from the Delaware W. to the Schuylkill, which is reached at 23d street, the first street W. of that river being 30th. These are crossed at right angles by named streets. This plan, though in general applied to the newer portions of the city, has been modified by the conformation of the land as determined by the curves of the rivers, while the suburbs in some instances were laid out upon an independent plan. A few irregular avenues, formerly highways leading to the country, stretch away from the original town plot. The buildings on the E. and W. streets are numbered toward the west, all between Front or 1st street and 2d street being between 100 and 200, and all between 2d and 3d streets between 200 and 300, and so on. On the N. and S. streets the buildings are numbered in either direction from Market street, certain streets being designated as boundaries of the hundreds. Market street, the great central street E. and W., is 100 ft. wide. Broad street, the central street N. and S., is 113 ft. in width. The other great streets are from 50 to 66 ft. wide, forming squares with sides of from 300 to 450 ft. In most cases the squares are subdivided by small streets laid out at a later period. Broad and Market streets are each continuously built up for about 4 m. The streets near the Delaware and parallel to it are all built up for greater distances than Broad street. The line of street lights from the S. W. corner of the gas mains at Darby, on the border of West Philadelphia, to the N. E. corner, near Holmesburg, is about 18 m. Chestnut street, the first E. and W. street S. of Market, is the fashionable thoroughfare. Walnut, Locust, Spruce, and Pine streets succeed each other on the south, and are occupied mainly by wealthy residents; further southward are Lombard, South, Shippen, Fitzwater, Christian, and Washington streets. N. of Market there are, first, Arch, Race, and Vine, leading and wealthy streets; next Callowhill, Spring Garden, and Green. The banking and financial centre is in 3d and Chestnut streets; the dry goods and other jobbing trade in 3d and Market; the commission houses in Front and Chestnut; the shipping and provision trade on Water street and Delaware avenue; the newspaper offices on 3d, Chestnut, and 7th streets.—The style of building has always been principally of brick, the vicinity producing very superior pressed brick at a low cost. Numbers of brick buildings remain standing and in good preservation which were erected before 1760; those built since 1800 have marble facings and marble steps, and are remarkably uniform in height and general character. All are conspicuous for neatness and durability; even the cheaply built blocks and suburban streets intended for laborers' residences are distinguished for neatness, and differ externally from those of the wealthier class more in size than in anything else. Tenement houses are almost unknown. This is largely due to the building and loan associations, monetary institutions peculiar to Philadelphia. For the best residences marble and brown stone have been much used. An improved style of cheaper dwellings, recently introduced, may be seen in Madison square and St. Alban's place near the Schuylkill, just S. of the original city. Here two rows of houses face each other across a wide street, through the middle of which stretches a park adorned with flowers and fountains, with ample room on either side for a walk or play ground for children. These streets are not designed for carriages, alleys in the rear of the houses being provided for teams. The houses are two stories high, and in St. Alban's place are surmounted by a Mansard roof. The chief business streets are now occupied with a large number of costly and superior buildings of marble, granite, iron, and sandstone. The custom house and subtreasury, formerly the second United States bank, stands on the S. side of Chestnut street, between 4th and 5th streets. It is of marble, and was completed in 1824, at a cost of $500,000; it has two fronts, one on Chestnut and the other on Library street, each ornamented with eight fluted Doric columns supporting a heavy entablature. The United States mint, of brick with marble facings, is in Chestnut above 13th street; it is of the Ionic order, and was erected in 1829. The post office, of white marble, is just above the custom house. A new building for this use is in course of construction at the corner of 9th and Chestnut streets, which will also be occupied by the United States courts and other government offices. It is to be of granite in the French renaissance style, four stories high, with an iron dome. The length is to be 428 ft., depth 152 ft., height to top of main cornice 90 ft., to top of dome 184 ft. The merchants' exchange is a fine structure of marble, with an ornamental front on Dock street, a semicircular colonnade of eight pillars, and a spacious rotunda within, on that side. The commercial exchange, built in 1870 of brown stone in the Roman-Gothic style, is in 2d street S. of Chestnut, on the site of the "slate-roof house," once the residence of William Penn. In Broad street, N. of Pine, is horticultural hall, a handsome building, in which the Pennsylvania horticultural society holds its annual fairs. The six-story publishing house of J. B. Lippincott and co., in Market street above 7th, and the building erected by Mr. George W. Childs for the "Public Ledger," on the corner of 6th and Chestnut streets, of brown stone, five stories high with Mansard roof, are noteworthy structures. The building of the American Sunday school union, erected in 1854, is in Chestnut between 11th and 12th streets. Here are the headquarters of the mission work of



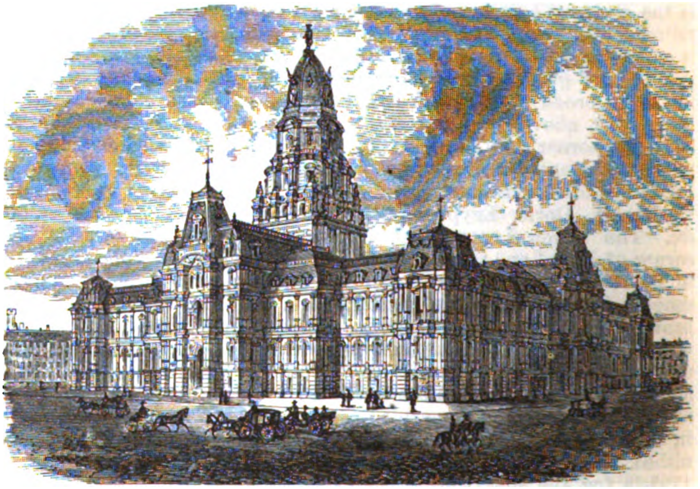
Public Ledger Building.

the union, and here its publication business is carried on. Nearly opposite the mint is the handsome new building of the Presbyterian board of publication. Near each other in 4th street, not far from Walnut, are the offices of the Pennsylvania and the Philadelphia and Reading railroad companies. The former, built in 1871–'2, is a spacious edifice of brick, with an elegant front of Quincy granite. The latter is a handsome building, enlarged and improved in 1871. In 3d street, near the former, is the spacious building of the Lehigh Valley railroad company. The new masonic temple is on the corner of Broad and Filbert streets; it is built of granite in the Norman style, and is 150 ft. broad by 250 ft. in length, the sides being 90 ft. above the pavement, with a tower at one corner 230 ft. high. The temple is richly ornamented, and contains several large halls finished in various styles of architecture, Corinthian, Doric, Egyptian, Ionic, oriental, &c. The Union League club house, at the corner of Broad and Sansom streets, was built in 1865; it is of brick in the French renaissance style, with façades of granite, brick, and brown stone. Its cost, including furniture, was about $200,000. The club was formed toward the close of 1862 for the purpose of aiding the federal cause in the civil war. The Reform club has a fine marble front building in Chestnut near 16th street, handsomely furnished. The Girard national bank (built in 1795–'8 for the first United States bank) in 3d street, the building of the Fidelity insurance, trust, and safe deposit company and the farmers' and mechanics' national bank in Chestnut street, of marble; the new building of the Provident life and trust company in 4th street, of iron; the tradesmen's national bank in 3d street, the Philadelphia national bank and the Pennsylvania life insurance and trust company's building in Chestnut street, of granite; and the bank of North America in Chestnut street, of brown stone, are handsome structures. The bank of North America, chartered by congress in 1781, was the first bank established in the United States. The largest hotel is the Continental, in Chestnut street, with fronts also on 9th and Sansom streets. It was opened in 1860, is six stories high, and covers 41,536 sq. ft. The Chestnut street front is of Albert and Pictou sandstone, and the others of fine pressed brick. On the opposite side of Chestnut street is the Girard house, and in Broad street near Chestnut the La Pierre house; both are fine architectural structures, built in part of brown stone. The Colonnade hotel, recently erected on the corner of 15th and Chestnut streets, is six stories high with a Mansard roof. Other hotels are the Merchants', in 4th street; the Bingham house, in Market street; the St. Cloud, in Arch street; the Irving house, in Walnut street; the American, Guy's, the Markoe house, the St. Lawrence, and the Washington house, in Chestnut street. Very many hotels exist in various parts of the city with the signs, arms, and insignia of revolutionary times. The "Old Swedes'" church, built in 1700, is the oldest church edifice in the city. It is of brick, and stands in an ancient cemetery, fronting on Swanson street near Christian. In the cemetery is the tomb of Wilson the ornithologist. Christ church (Episcopal), in 2d street near Market, begun in 1727, is still a fine building and in perfect preservation. The spire is 196 ft. high, and contains a chime of bells cast in London in 1754. The graveyard, on the corner of 5th and Arch streets, contains the remains of Franklin. St. Peter's church (Episcopal), in 3d and Pine streets, built in 1758–'61, has a tower containing a chime of bells. In the churchyard is a monument to Commodore Decatur. The Friends' meeting house, secluded in a broad graveyard, in Arch street near 3d, deserves mention; it was built in 1808. Among Episcopal churches, St. Mark's, in the later or English Gothic style, in 16th and Locust streets; the church of the Holy Trinity, in the Norman style, in 19th and Walnut streets; and the church of the Incarnation, in Broad and Jefferson streets, are fine specimens of architecture. The West Arch street Presbyterian church is a very handsome and spacious structure in the Roman-Corinthian style; the West Spruce street, the Calvary, the Washington square, and the second (21st and Walnut streets) Presbyterian churches are fine buildings in various styles. The Roman Catholic cathedral of St. Peter and St. Paul, in 18th street opposite Logan square, erected in 1846–'64, is an imposing specimen of Roman-Corinthian architecture; it is of red sandstone, 136 ft. front by 216 ft. deep, and is crowned by a

Masonic Temple.

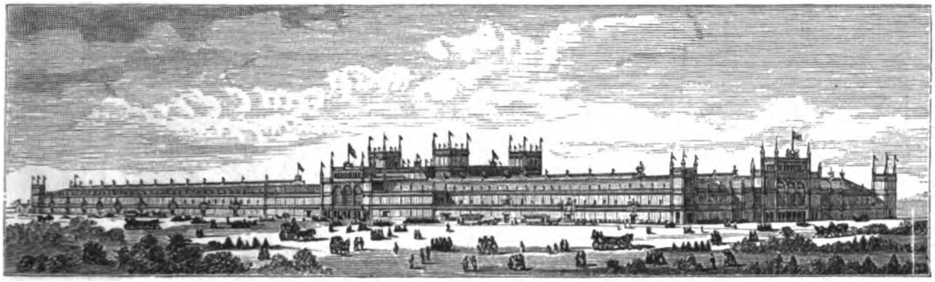
Independence Hall.

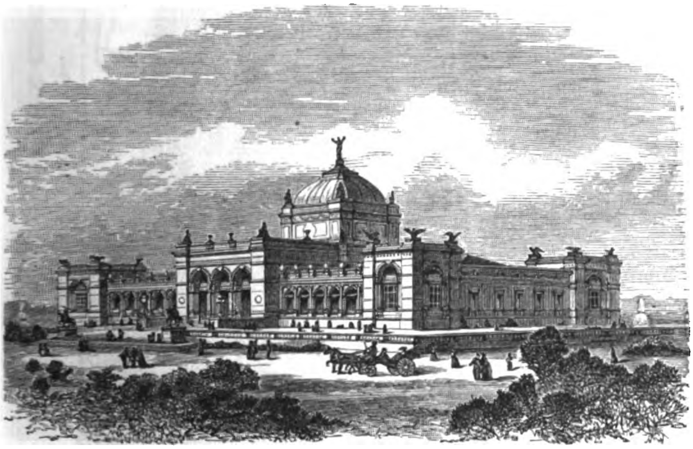
dome 210 ft. high. The façade consists of a classic pediment upheld by four lofty Corinthian columns, flanked by pilastered wings. The interior is cruciform, and is adorned with frescoes. At the intersection of Broad and Arch streets are the Arch street Methodist Episcopal church, of white marble; the first Baptist church, of brown stone; and a Lutheran church, of green serpentine. The central Congregational church, in 18th and Green streets, is a handsome building in the late Norman style. The Beth-Eden Baptist church, in Broad and Spruce streets, is a fine structure of green serpentine. The Broad street synagogue is a handsome though peculiar building of the Saracenic order.—The most prominent objects of historical interest in the city are the Penn treaty monument and Carpenters' and Independence halls. The monument is at Kensington (formerly Shackamaxon), and occupies the site of the elm tree, blown down in 1810, under which, according to tradition, William Penn made his famous treaty with the Indians; it is of stone and insignificant in appearance. Carpenters' hall, in Chestnut between 3d and 4th streets, is the place of meeting of the first continental congress in 1774. It was built in 1770 by the carpenters' company, which still owns it. It is open to visitors, and has been fitted up to represent its appearance at the time of the revolution, and its walls are hung with mementoes of that period. Independence hall signifies generally the whole of the old state house, but more specifically the large eastern room of the lower floor. It was built in 1732–'5. Here the second continental congress adopted the declaration of independence. In this hall Lafayette had a great public reception in 1824, and in 1830 a movement was commenced to restore it to its original condition, and to set it apart "for dignified purposes only." The portraits of the great men of the revolution were procured, and historical relics were placed there for permanent preservation. In 1854 the consolidated city took a renewed interest in it; the old independence bell was taken from the tower and placed in the hall, a large number of portraits from the Peale gallery were hung on the walls, and a keeper was appointed. It is open to visitors. Independence hall is the centre of a line of ancient buildings, called State House row, those on either side of it being occupied by courts and city and county offices. They are on the S. side of Chestnut street, between 5th and 6th, fronting on a broad paved sidewalk, which is shaded with trees and contains a statue of Wash-



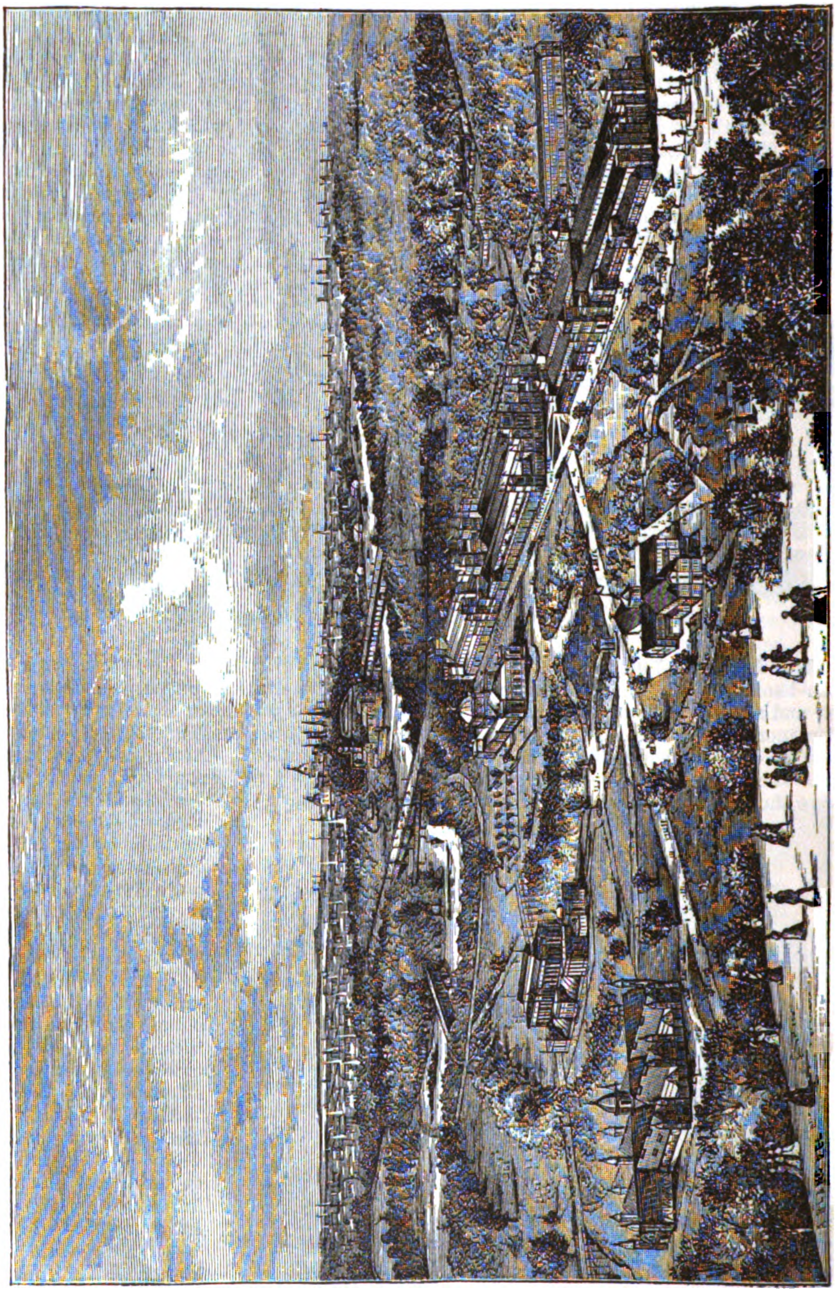
New City Hall.

ington. The United States arsenal at Frankford is devoted to the manufacture of fixed ammunition, all the cartridges for the army being made here. The grounds cover 62½ acres, are beautifully situated and laid out, and are well kept. On Gray's Ferry road, near the naval asylum, is another United States arsenal, devoted to the manufacture of army clothing.—There are five small public squares in the original city: Logan square, at 18th and Race streets; Franklin square, at 6th and Race streets; Independence square, fronting on Walnut street in the rear of Independence hall; Washington square, at 6th and Walnut streets, diagonally opposite Independence square; and Rittenhouse square, at 18th and Walnut streets. These are laid out as parks and shaded with trees. Franklin square contains a large fountain. On what was formerly Penn square, at Broad and Market streets, the new city hall is in course of construction. It is to be 470 ft. from E. to W. and 486½ ft. from N. to S., containing 520 rooms, and covering an area, exclusive of the courtyard, of nearly 4½ acres. It is to consist of four stories, together 100 ft. high. From the N. front will rise a tower surmounted by a dome, the apex of which will be nearly 300 ft. above the pavement. The exterior walls are to be of white marble, and those facing the courtyard of light blue marble. The cost will be about $7,000,000. There are about half a dozen other small parks in different sections of the city. The great park of Philadelphia, and one of the largest in the world, is Fairmount park, embracing 2,740 acres. It extends along both banks of the Schuylkill for more than 7 m., and along both banks of the Wissahickon for more than 6 m., commencing at Fairmount, an elevation on the Schuylkill, from which the park derives its name, about 1½ m. above the original city, and extending to Chestnut hill on the Wissahickon, a total distance of nearly 14 m. It possesses much natural beauty, being well wooded and having a great variety of surface. The park was established mainly for the purpose of securing a supply of pure water for the city by preventing the occupation and contamination of the streams by factories. In the S. W. portion of this park, W. of the Schuylkill river, is to be held from May 10 to Nov. 10, 1876, the international exhibition in celebration of the centennial anniversary of American independence. The buildings, now in course of erection, consist of the main exhibition building, the art gallery, the machinery building, horticultural building, and agricultural building. The art gallery and the horticultural building are intended to be permanent; the others are temporary. The main building is 1,880 ft. long from E. to W. and 464 ft. wide, covering 20 acres. It is for the most part of one story, the main cornice on the outside being 45 ft. above the ground, and the interior height 70 ft. At the centres of the sides are projections 416 ft. long,


Main Exhibition Building.


Fine Art Gallery.

and at the centres of the ends other projections 216 ft. long. In these projections are the main entrances, which are provided with arcades on the ground floor, and central façades extending to the height of 90 ft. On the corners of the building are towers 75 ft. high, and between these and the central projection there is a lower roof with the cornice 24 ft. above the ground. The roof over the central part for 184 ft. square has been raised above the surrounding portion, and at the corners of this elevated portion are towers 48 ft. square and 120 ft. high. The building is divided into sections of various size, which are assigned


Agricultural Hall. Horticultural Hall. Memorial Hall or Art Gallery. Main Exhibition Building. Machinery Building.

THE CENTENNIAL EXHIBITION GROUNDS AND BUILDINGS to the different states and nations. The foundations consist of piers of masonry. The superstructure is composed of wrought-iron columns, which support wrought-iron roof trusses. The sides for the height of 7 ft. from the ground are finished with brickwork in panels between the columns, and above this with glazed sash. The art gallery is situated on the "Lansdowne plateau," N. of the main building, 116 ft. above the Schuylkill. The structure is in the modern renaissance style, and is built of granite, glass, and iron. It is 365 ft. long, 210 wide, and 59 high, above a spacious basement 12 ft. high, and is surmounted by a dome rising 150 ft. above the ground. The dome terminates in a colossal bell, from which the figure of America rises, and at each corner of its base stands a colossal figure. The machinery building is W. of the main exhibition building, and consists of a main hall 360 by 1,402 ft., and an annex on the S. side 208 by 210 ft., the whole covering 12·82 acres. The horticultural building, situated on the plateau N. of the art gallery, is in the Moresque style of architecture of the 12th century, and is built principally of iron and glass; it is 383 ft. long, 193 wide, and 72 high to the top of the lantern. The main floor is occupied by the central conservatory, 230 by 80 ft. and 55 ft. high, surmounted by a lantern 170 ft. long, 20 wide, and 14 high. On the N. and S. sides of the central conservatory are four forcing rooms, each 100 by 30 ft., covered with curved roofs of iron and glass. The agricultural building is N. of the horticultural building, and is to be constructed of wood and glass. It consists of a nave crossed by three transepts, both nave and transepts being composed of Gothic arches. The nave is 820 ft. long, 125 wide, and 75 high from the floor to the point of the arch. The central transept is of the same height, and has a breadth of 100 ft., the two end transepts being 70 ft. high and 80 ft. wide. The ground plan of the entire structure is a parallelogram 540 by 820 ft., covering more than 10 acres. The entire cost of the five buildings is to be about $4,500,000.—There are many cemeteries in the city, beautifully laid out, ornamented with trees, flowers, and shrubbery, and containing numerous handsome monuments. The principal one is Laurel Hill, established in 1835, occupying a slope on the E. bank of the Schuylkill, adjoining the upper part of Fairmount park; it embraces nearly 200 acres, and is divided into three sections, called North, South, and Central Laurel Hill. West Laurel Hill cemetery, incorporated in 1869, is situated a short distance further up on the W. bank of the Schuylkill, within the limits of Montgomery co.; it contains 110 acres. Other cemeteries are Mount Peace and Mount Vernon, near Laurel Hill; Glenwood, Odd Fellows', and Monument, S. E. of these; and Cathedral (Roman Catholic), Mount Moriah, and Woodlands, in West Philadelphia, S. of Fairmount park, the last being situated on the bank of the Schuylkill.—The growth of Philadelphia has been steady and rapid. The population of the city and county, according to the United States censuses, has been as follows:

Censuses.	City.	County.	Censuses.	City.	County.
1790....	28,522	54,391	1840....	93,665	258,037
1800....	41,220	81,009	1850....	121,376	408,762
1810....	53,722	111,210	1860....	565,529	565,529
1820....	63,802	137,097	1870....	674,022	674,022
1830....	80,458	188,797			

The total population in 1870 includes 22,147 colored persons. There were 320,379 males and 353,643 females, 490,398 natives and 183,624 foreigners, of whom 96,698 were born in Ireland, 50,746 in Germany, 22,034 in England, 4,175 in Scotland, 2,479 in France, 1,791 in Switzerland, and 1,488 in British America; 26,705 persons who could not read, and 42,565 who could not write, of whom 13,996 were natives and 28,569 foreigners, 5,012 were from 10 to 21 years old, and 37,553 were 21 and upward. There were 89,388 males and 93,438 females between 5 and 18 years of age, 138,526 males between 18 and 45, and 173,676 21 years old and upward, of whom 149,976 were citizens of the United States and 23,700 unnaturalized foreigners. The number of families was 127,746, with an average of 5·28 persons to a family; of dwellings, 112,366, with an average of 6·01 persons to a dwelling. The most densely populated ward averaged 8·42 persons to a dwelling. Philadelphia is conspicuous for the number and neatness of its dwellings, the great extent of the city in various directions rendering land comparatively cheap, and bringing the possession of a home within the means of artisans and others of limited income. It had nearly twice as many dwellings in 1870 as New York, and averaged less than one half as many persons to a dwelling. Of the 217,685 persons 10 years old and upward returned as engaged in all occupations, 8,690 were employed in agriculture, 63,869 in professional and personal services, 43,960 in trade and transportation, and 106,166 in manufactures and mechanical industries. In 1873 the number of marriages was 7,891, or 10·52 in every 1,000 of the inhabitants; of births, 18,702, or 24·93 in 1,000; of deaths, 16,736, or 20·29 in 1,000. In 1874 there were 6,639 marriages, 19,387 births, and 15,238 deaths.—Horse cars run frequently to various quarters of the city, to accommodate local travel. The latest statistics of the horse railroads are as follows: number of companies, 17; miles of road laid, 214; cost of road and equipment, $7,202,068; number of passengers carried during the year, 63,771,195; gross earnings, $4,622,351; expenses, $3,356,436. Several fine bridges, both for railroad and ordinary travel, span the Schuylkill, and six steam ferries (fare five cents) ply across the Delaware to the New Jersey shore, one to Gloucester and the others to Camden. Philadelphia is connected with New

York and the west by the Pennsylvania railroad; with different points in the state of Pennsylvania by the Philadelphia and Reading, the Germantown and Norristown, the North Pennsylvania, and the West Chester and Philadelphia railroads, and the Philadelphia and Erie division of the Pennsylvania railroad; and with the south by the Philadelphia, Wilmington, and Baltimore, and the Philadelphia and Baltimore Central railroads. By ferry to Camden, N. J., communication is had with the Camden and Amboy division of the Pennsylvania railroad, for South Amboy; with the Camden and Atlantic railroad, for Atlantic City; with the Camden, Mt. Holly, and Pemberton railroad, for Long Branch; and with the West Jersey railroad, for Bridgeton, Salem, and Cape May. There are numerous regular lines of steamers to southern and other coastwise ports, a fortnightly line to Havana and New Orleans, a weekly line to Liverpool, and a weekly line to Antwerp. The bar in the river below the city has 19 ft. at low and 25 ft. at high water. The wharf front of the city has extraordinary depth of water, there being 57 ft. at low water at the pier heads for half a mile, and not less than 25 ft. for 3 m. of the river front. The occupied commercial front is 7 m. on the Delaware and 4 m. on the Schuylkill. A strong current setting on the W. shore of the Delaware at both flood and ebb tide prevents encroachments on the harbor by deposit. The rise of tide is but 6 ft., and floods or overflows are unknown. Just below the city, on Mud island, is Fort Mifflin, commanding the river; and on Tinicum island, 11 m. below, are the quarantine station and hospital. The United States navy yard, embracing 18 acres on the Delaware about a mile below Market street, is to be sold, and League island, comprising 600 acres, having been presented to the government by the city, is to be occupied as a naval station.—The customs district of which Philadelphia is the port includes the city of Camden, N. J., and all the shores of the Delaware and its tributaries within the state of Pennsylvania. The value of its foreign commerce for the five years ending June 30, 1874, is shown in the following table:

YEARS.	Imports.	Exports.
1870	$14,500,797	$16,934,610
1871	17,728,006	17,920,283
1872	20,383,858	21,016,750
1873	25,398,150	24,239,357
1874	26,447,037	33,121,337

The exports of petroleum, breadstuffs, and provisions for the four calendar years last past have been as follows:

YEARS.	PETROLEUM.				Breadstuffs.	Provisions.
	Refined.		Crude.			
	Quantity, gallons.	Value.	Quantity, gallons.	Value.	Value.	Value.
1871	51,352,996	$12,512,109	3,833,979	$678,906	$4,148,595	$341,332
1872	47,981,845	11,209,583	7,216,058	1,192,090	4,100,979	282,954
1873	80,166,187	14,967,786	4,837,894	566,443	5,556,846	1,137,332
1874	70,810,711	9,866,517	1,614,116	145,939	3,159,371	3,372,719

In 1874 there were also exported 1,729,862 gallons of naphtha and benzine, valued at $135,607; 61,043 tons of coal, $302,684; 14,298,118 lbs. of cotton, $2,107,981; hides, $656,647; engines and machinery, $998,567; leather and manufactures of, $315,568; 18,267,882 lbs. of oilcake, $374,353; 9,126,657 lbs. of tallow, $738,704; 9,878,159 lbs. of leaf tobacco, $997,715; cooperage, $886,897; besides numerous minor articles. The number of entrances in the foreign trade during the year was 1,008, tonnage 621,641; clearances, 1,105, tonnage 647,965; entrances in the coastwise trade, 1,528, tonnage 664,456; clearances, 1,658, tonnage 812,409. The number of vessels belonging in the district on June 30, 1874, was 3,040, tonnage 394,760, viz.: 934 sailing vessels, 146,953 tons; 265 steamers, 72,206 tons; 1,810 canal boats, 170,567 tons; and 31 barges, 5,034 tons. There were built during the year ending on that date 120 vessels, tonnage 31,198, viz.: 26 sailing vessels, 7,610 tons; 33 steamers, 16,368 tons; 59 canal boats, 6,948 tons; and 2 barges, 272 tons. Of the steamers, 11, tonnage 14,383, were iron. The coal trade of the port is immense, vast quantities being brought here for shipment to coastwise ports. Kensington, about 2 m. N. of Market street, is the chief seat of ship building in the city, but the business is extensively carried on at Chester and other points on the Delaware within the customs district.—Philadelphia is preëminent for its manufactures, for which its proximity to the iron and coal fields of Pennsylvania affords great facilities. In 1870, according to the United States census, it was the first city in the Union in the number of manufacturing establishments and of hands employed, in the amount of capital invested and of wages paid, and in the value of materials used; it was surpassed only by New York in the value of manufactured products. The number of establishments was 8,184, with 1,611 steam engines of 40,528 horse power, and 59 water wheels of 2,696 horse power; number of hands, 137,496, of whom 95,421 were males above 16, 32,687 females above 15, and 9,388 youth; capital, $174,016,674; wages paid during the year, $58,780,130; value of materials used, $180,325,713; of products, $322,004,517. The statistics of the principal branches are contained in the following table:

INDUSTRIES.	No. of establishments.	Hands employed.	Capital invested.	Value of materials used.	Value of products.
Bleaching and dyeing	75	709	$819,000	$5,884,424	$6,927,058
Bookbinding	70	1,734	1,557,557	1,768,482	8,362,895
Boots and shoes	200	6,864	8,269,302	8,908,227	9,231,848
Brass founding and finishing	40	482	661,985	391,432	969,844
Bread and other bakery products	581	1,619	1,287,625	2,182,832	8,781,189
Brick	89	3,060	2,294,500	701,034	8,112,906
Carpets	286	4,991	2,997,650	5,612,198	9,798,019
Carriages and wagons	115	1,608	1,888,097	667,808	2,281,361
Cars, freight and passenger	9	1,500	1,581,000	1,405,545	2,885,469
Chromos and lithographs	38	448	572,000	187,378	789,184
Cigars	891	1,680	963,140	888,622	2,112,521
Clothing	589	13,988	8,047,493	9,741,219	17,757,932
Coal oil, refined	15	207	792,000	1,082,979	1,404,582
Coffee and spices, ground	16	171	377,800	1,019,035	1,299,235
Confectionery	116	808	845,250	942,228	2,014,711
Cooperage	78	695	391,515	458,595	1,111,340
Cordage and twine	6	191	508,700	428,852	921,570
Cotton goods, not specified	66	6,108	6,042,440	4,808,076	8,272,698
Dentists' materials	6	822	797,000	140,250	512,500
Drugs and chemicals	78	1,270	4,888,200	4,886,082	7,028,711
Fertilizers	12	841	1,405,000	791,756	1,485,452
Flouring-mill products	28	195	624,500	8,781,008	4,822,228
Frames, mirror and picture	38	565	528,850	896,981	1,084,858
Furniture	237	2,898	2,782,555	1,800,409	5,180,858
Furs, dressed	44	457	628,850	497,718	959,888
Galvanizing	4	111	169,000	466,296	689,526
Gas	2	1,143	7,900,000	1,141,557	3,004,875
Gas lamps and fixtures	9	919	1,184,894	428,447	1,171,788
Glassware	8	1,174	1,038,016	403,672	1,865,648
Glass, window	2	250	190,000	108,620	245,000
Grease and tallow	7	46	128,175	482,581	587,706
Hats and caps	51	1,125	564,575	720,547	1,688,306
Heating apparatus	27	842	511,580	418,487	1,197,066
Hosiery	72	4,702	2,871,900	2,821,995	5,164,405
Iron, forged and rolled	11	1,046	1,498,500	1,863,994	2,970,492
" anchors	1	86	15,000	102,000	185,000
" bolts, nuts, &c	17	770	900,100	697,880	1,392,182
" pipes, wrought	3	859	3,100,000	1,978,025	3,805,760
" railing, wrought	6	36	22,500	11,259	47,278
" ship building and engines	1	852	750,000	187,000	472,000
" castings, not specified	68	2,551	3,844,424	2,589,551	5,236,459
" stoves, heaters, &c	9	980	2,270,000	568,026	1,678,582
Jewelry	58	688	894,850	660,796	1,588,741
Lead pipe	2	87	600,000	470,000	590,000
Leather, tanned	23	337	1,003,172	1,121,950	1,651,648
" curried	32	205	854,528	1,087,580	1,294,288
" morocco, tanned, &c	24	995	1,824,778	2,028,480	3,190,041
Liquors, distilled	28	182	1,066,000	861,220	1,940,255
" malt	57	648	3,325,850	1,900,525	3,380,613
Lumber, planed	11	251	443,800	424,040	708,175
" sawed	10	197	982,890	799,952	1,116,946
Machinery, not specified	107	3,628	5,470,716	2,088,674	5,841,886
" cotton and woollen	26	858	1,583,800	506,850	1,486,449
" locomotive	3	2,178	2,275,000	1,799,832	3,490,279
" engines and boilers	30	1,098	1,582,241	1,186,816	2,450,224
Malt	8	149	875,000	786,886	1,068,500
Meat, cured and packed	18	200	1,861,000	3,994,550	4,800,802
" packed, pork	7	97	801,000	1,591,340	2,028,800
Molasses and sugar, refined	14	1,154	5,494,000	23,809,762	25,949,876
Oil, animal	9	58	382,000	750,150	1,049,000
" linseed	4	100	520,000	461,275	678,490
Paints	23	429	1,750,250	1,786,941	2,958,608
Paper	11	691	2,242,500	1,567,915	7,487,911
Paper hangings	5	397	988,000	549,450	884,500
Patent medicines	43	365	1,526,084	2,988,802	6,101,592
Perfumery and fancy soaps	19	288	526,500	261,216	768,845
Printing of cloths	6	678	1,495,000	4,678,960	5,718,584
Printing and publishing	76	3,115	7,706,500	3,866,722	10,107,451
Printing, job	76	784	714,800	862,482	1,041,714
Saddlery and harness	87	614	588,600	509,577	1,185,458
Sash, doors, and blinds	45	751	1,047,885	812,555	1,656,488
Saws	8	619	760,500	466,250	1,087,700
Sewing machines	8	325	721,500	188,928	685,500
Ship building and repairing	32	648	962,800	861,608	1,085,177
Silk, not specified	8	817	1,254,000	720,874	1,382,900
" sewing and twist	2	119	175,000	198,150	300,000
Soap and candles	59	594	1,872,200	1,811,129	2,490,941
Steel, cast	6	528	1,450,000	1,030,278	1,858,250
" springs	8	147	1,161,000	855,709	687,768
Stereotyping and electrotyping	10	555	987,000	148,950	792,200
Stone and earthenware	19	585	722,000	380,722	877,550
Tin, copper, and sheet-iron ware	219	1,284	828,648	875,994	2,096,548
Umbrellas and canes	22	1,848	1,018,982	1,050,300	2,044,726
Upholstery	77	671	564,638	586,757	1,222,094
Wood, turned and carved	55	567	218,502	186,969	707,452
Woollen goods	123	7,528	8,101,050	11,173,978	17,948,826
Worsted goods	29	3,724	3,149,600	4,858,286	7,762,869

—There are 29 national banks, the condition of which on Oct. 2, 1874, was as follows:

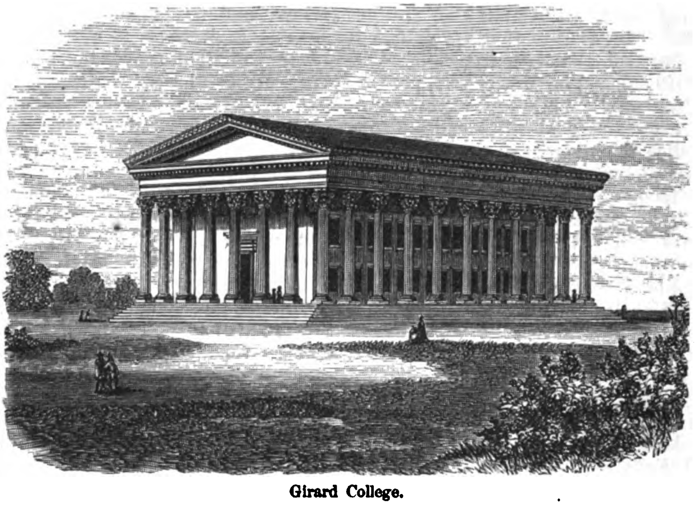
RESOURCES.		
Loans and discounts	$47,898,261	18
Overdrafts	21,519	97
United States bonds, to secure circulation	18,668,200	00
" " " to secure deposits	225,000	00
" " " on hand	321,300	00
Other stocks, bonds, and mortgages	1,578,250	81
Due from redeeming and reserve agents	4,985,566	48
Due from other national banks	2,595,814	03
Due from state banks and bankers	669,605	20
Real estate, furniture and fixtures	2,828,346	88
Current expenses	556,196	81
Premiums paid	188,139	21
Checks and other cash items	888,918	56
Exchanges for clearing house	6,728,988	25
Bills of other national banks	1,229,638	00
Bills of state banks	819	00
Fractional currency	184,880	55
Specie	872,049	67
Legal-tender notes	5,876,459	00
United States certificates of deposit for legal-tender notes	8,790,000	00
Deposit with United States treasurer	698,968	00
Total	$98,691,416	55
LIABILITIES.		
Capital stock paid in	$16,985,000	00
Surplus fund	7,169,154	18
Undivided profits	1,922,460	62
National bank notes outstanding	11,722,725	00
State bank notes outstanding	42,491	00
Dividends unpaid	47,654	28
Individual deposits	46,784,450	55
United States deposits	150,792	51
Due to national banks	6,749,007	16
Due to state banks and bankers	2,215,049	26
Bills payable	2,682	04
Total	$98,691,416	55

There are 12 state banks of deposit and discount; aggregate capital about $1,000,000; deposits $2,500,000; resources more than $4,000,000. Business between the banks is transacted through a clearing house. There are 5 safe deposit and trust companies (aggregate capital $5,925,000), 6 savings banks, 30 fire insurance, 8 fire and marine insurance, 14 life insurance, and 2 accident insurance companies, besides numerous agencies of companies domiciled elsewhere. The building and loan associations, of which there are about 600, are savings institutions, and have about $20,000,000 invested in dwellings and mortgages. There are several important commercial bodies, including the board of trade, chamber of commerce, commercial exchange, &c. The United States mint was established in 1792. The coinage for the year ending June 30, 1874, amounted to $29,842,390, viz.: gold, $26,467,330; silver, $2,963,135; other, $411,925. The entire coinage from the opening of the mint to the above date was $584,813,091 64, viz.: gold, $462,517,266; silver, $109,904,012 10; other, $12,391,813 54.—Nearly half the area of the city is still farm land, and in the N. and W. portions farming and market gardening are carried on. The number of acres of land in farms, according to the census of 1870, was 40,304, of which 37,518 were improved; cash value of farms, $18,945,000; estimated value of farm products, $2,231,366.—Philadelphia is divided into 31 wards. The chief executive officer is the mayor, elected by the people for three years. The legislative authority is vested in a select council of 31 members (one from each ward), elected for three years, and a common council of 68 members, elected for two years. There are also a city comptroller, city treasurer, city solicitor, and receiver of taxes. Boards of commissioners have the management of Fairmount park, the public buildings, the gas works, the city trusts, the health department, &c. The chief county officers are three commissioners, the sheriff, recorder of deeds, register of wills, district attorney, and coroner, elected by the people for three years. The United States courts for the eastern district of Pennsylvania meet here, and terms of the state supreme court are held here. There are four courts of common pleas, each consisting of three judges, which have coördinate jurisdiction in civil matters within the city. These judges designate one or more of their number to hold the courts of oyer and terminer and of quarter sessions, which have criminal jurisdiction only. There are also an orphans' court of three judges, with probate powers, and magistrates' courts. Philadelphia sends 8 senators and 38 representatives to the state legislature, and 5 members to congress. The police force is under command of a chief assisted by four captains, and consists of 1,200 men. There is a paid fire department, under the control of a board of seven commissioners. On Jan. 1, 1875, the force consisted of a chief engineer, 5 assistant engineers, and 389 men, organized into 27 steam engine companies and 5 hook and ladder companies. There is a fire alarm telegraph, but the number of alarm boxes is inadequate. The number of fires during 1874 was 592, with a loss of property estimated at $754,688. The amount appropriated for the use of the department during that year was $536,400. The city is supplied with water from the Schuylkill and Delaware rivers, chiefly from the former. There are seven works: the Fairmount, on the Schuylkill, at the lower extremity of the park, the Schuylkill, the Spring Garden, the Delaware, the Belmont, the Roxborough, and the Frankford. These works in 1874 pumped 14,533,425,097 gallons, an average of 42,111,730 gallons per day. At the close of that year there were 628 m. 4,507 ft. of pipe, 5,119 fire plugs, and 68 public drinking fountains, of which 61 were erected by the fountain society and 7 by the society for prevention of cruelty to animals. The water department is in charge of a chief engineer. Gas works were first constructed on a general scale in 1835; they were principally conducted by the authorities of the original city, and were very successful. In 1855 and 1858 the works owned by the municipalities were consolidated with those of the city proper; and in 1859 the works of two companies, previously independent, were purchased, bringing the whole service under the control of the city as its property. Great care was taken in the original establishment of the city gas works to secure the best improvements then effected in the manufacture of coal gas in European cities, and they have from the outset furnished gas cheaper than in any other American city. Philadelphia has a large number of markets, some of which are of large size and superior character. The city owns some of them, but most have been built by incorporated companies. The assessed value of property in 1875 was $575,288,968, of which $520,594,067 was city property, assessed at $1 90 per $100; $33,985,746 suburban, assessed at $1 26⅔; and $20,704,155 farm, assessed at $0 95. The tax produced by these rates amounted to $10,518,462 86. The true value of property in 1874 was estimated at $1,025,785,831. The receipts into the city treasury during that year amounted to $15,535,918 15, of which $10,755,726 42 were derived from taxes, $2,135,950 from loans, and $2,644,241 73 from miscellaneous sources. The payments amounted to $16,148,099 59. The principal items were as follows: warrants of previous years, $2,378,042 72; loans, $3,036,714 21; interest on city loans, $3,654,466 58; interest on indorsed warrants, $116,945 07; judgments, executions, &c., $122,723 70; sinking funds, $681,987; city commissioners, $353,507 76; markets, &c., $102,151 99; city solicitor, $179,416 54; fire commission, $299,567 23; highways, $1,118,096 12; board of health, $200,209 13; lighting the city, $332,676 06; police, $632,704 28; guardians of poor, $355,169 26; schools, $859,781 17; water, $416,386 29; park commission, $108,168 57; public buildings, $618,298 76. The funded debt on Jan. 1, 1875, was $55,272,132 40; debt guaranteed by the city for gas loans, $4,999,400; floating debt, $4,018,931 25; total, $64,290,463 65. The sinking fund amounted to $9,047,556 50, and the cash in the treasury to $1,976,019 60. The entire assets of the city, including public buildings, public grounds, &c., were estimated at $77,624,025 10. The post office department, besides the main office, embraces 20 stations or sub-offices, designated by letters of the alphabet, and also known locally by separate names. There are 880 letter boxes and 207 carriers, 157 attached to the main office and 50 to the stations at West Philadelphia, Port Richmond, Frankford, Germantown, Chestnut Hill, and Manayunk, the area covered by the carrier service being 67⅔ sq. m. The other 14 stations have only a superintendent, viz.: Tacony, Holmesburg, Torresdale, Byberry, Bustleton, Somerton, Oxford Church, Olney, Crescentville, Fox Chase, Milestown, Verree's Mills, Wheat Sheaf, and Falls of Schuylkill.—The benevolent institutions of Philadelphia are numerous. The Pennsylvania hospital, founded in 1752, has spacious buildings occupying the square bounded by 8th, 9th, Spruce, and Pine streets. It is supported almost entirely by voluntary contributions, and since its origin has expended more than $1,200,000 in the support of the sick and injured. A separate insane department (Pennsylvania hospital for the insane) was established in 1841; it has fine buildings and grounds in West Philadelphia. The Friends' asylum for the insane at Frankford, opened in 1817, has large and beautiful grounds and accommodations for about 100 patients, who are chiefly supported by their own means, but in some cases receive assistance from the funds of the asylum. There are more than 40 hospitals, dispensaries, and lying-in asylums, among which may be mentioned the hospital of the university of Pennsylvania and the Philadelphia and Presbyterian hospitals, in West Philadelphia; the Wills ophthalmic hospital, in Race street opposite Logan square; the children's hospital, in 22d street near Locust; the German hospital, in Corinthian avenue on the corner of Girard avenue; the Jewish hospital, in West Philadelphia; the charity hospital of Philadelphia, in Hamilton street; the Episcopal hospital, in Front and Huntingdon streets; St. Joseph's (Roman Catholic) hospital, in Girard avenue near 16th street; the homœopathic hospital, connected with the Hahnemann medical college; the woman's hospital, connected with the woman's medical college; the Philadelphia dispensary, in S. 5th street; the southern dispensary, in Bainbridge street; the northern dispensary, in Fairmount avenue; and the Preston retreat (lying-in charity), in Hamilton and 20th streets. The Blockley almshouse is in West Philadelphia near the university. The buildings, four in number, are each 500 ft. long and enclose a square. A well cultivated farm of 180 acres surrounds them. This institution embraces a department for the poor, a hospital, an insane asylum, and a children's asylum. The average number of inmates is more than 3,500, of whom about 1,000 are insane. It is supported by the city at an annual expense of more than $300,000. The Pennsylvania institution for the deaf and dumb, in Broad and Pine streets, was opened in 1820. There are a few paying pupils, and some are supported by the states of Delaware and New Jersey, but the greater number are maintained at the expense of Pennsylvania. The Pennsylvania institution for the instruction of the blind is similarly supported; it was founded in 1833, and is at the corner of 20th and Race streets. The United States naval asylum, built in 1832, is on Gray's Ferry road below South street. The main building has a marble front, 380 ft. long, 150 ft. deep, and three stories high, approached by a flight of marble steps. The grounds are large and finely ornamented. About 130 superannuated sailors are maintained here. In the rear of the asylum is a large hospital for the care of sick and wounded sailors. Among other benevolent institutions and associations, besides numerous lodges of freemasons, odd fellows, and similar societies, may be mentioned the Presbyterian home for women, in 58th street and Greenway avenue;

the educational home for boys, in Greenway avenue near 49th street; St. John's male orphan asylum, in Westminster avenue near 49th street; the industrial home for blind women, in 39th and Locust streets; the Franklin reformatory home for inebriates, in Locust street; the Magdalen society, in 21st street near Race; St. Joseph's female orphan asylum, in Spruce street; the Penn widows' asylum, in Belgrade street near Otis; the colored orphans' shelter, in West Philadelphia; the home for aged and infirm colored persons, in Belmont and Girard avenues; and the house of the Good Shepherd (for the reformation of unfortunate females), in 22d street near Walnut. The eastern penitentiary, a state institution, completed in 1829, embraces an entire square, fronting on Fairmount avenue between 22d and 23d streets. It is the only prison in the country conducted on the separate system. It has a library of more than 8,000 volumes. (See PENNSYLVANIA, and PRISONS.) The county prison, first occupied in 1835, is on the Passayunk road below Reed street, and consists of a massive centre building, with wings flanked by heavy octangular towers, beyond which are walls terminating in bastions. It is in the Tudor style of English Gothic; the walls are of Quincy granite. With the exception of the women's department, it is overcrowded. The house of correction, recently erected at Holmesburg on the Delaware, at a cost of more than $1,000,000, is intended for the confinement of paupers able to work and of persons convicted of misdemeanors. It is of brown stone, and has accommodations for 1,500 inmates. The house of refuge, opposite Girard college, was incorporated in 1826, for "the employment of the idle, instruction of the ignorant, and reformation of the depraved." It has separate apartments for boys and girls. The number of inmates on Sept. 30, 1874, was 597.—The public schools are under the charge of a board of public education, consisting of 31 members, one from each ward, with a subordinate board of directors for each ward. The following are the statistics for 1874:

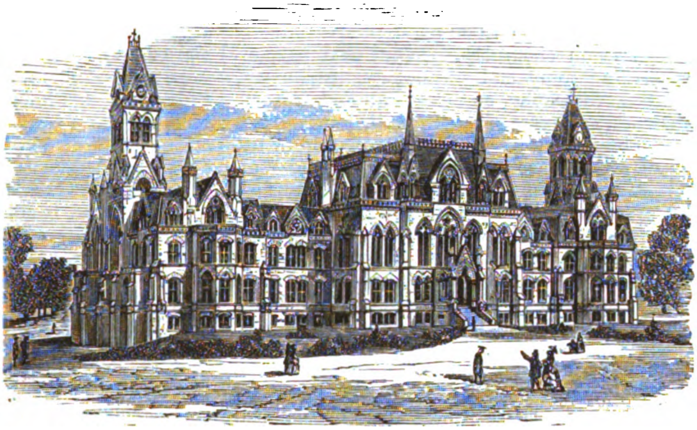
Number of schools (2 high, 60 grammar, 29 consolidated, 121 secondary, and 212 primary)	424
Average number of months taught	10
Number of male teachers	78
" of female teachers	1,698
Number of pupils registered	133,734
" " belonging to the schools at the close of the year	92,086
Average attendance	79,565
Amount paid for salaries of teachers	$991,475 89
" " for lots, houses, additions, and repairs	$497,639 04
Books, stationery, fuel, and contingencies	$527,269 43
Total amount expended for school purposes	$2,016,378 86
Valuation of school property	$4,537,836 00

The high schools are the central high school for boys and the girls' normal school. The former affords instruction in Latin, German, and the higher English branches, and confers degrees. The latter is designed especially to prepare teachers for the public schools. The number of instructors in the high school in 1874 was 17; pupils at beginning of year, 570; admitted during year, 300; left, 259; remaining at close, 611; average attendance, 614. The number of instructors in the normal school was 13; pupils at beginning of year, 537; admitted during year, 250; left, 182; remaining at close, 605; average attendance, 582. There are also evening schools during the autumn and winter months for those unable or too old to attend the day schools. The number in 1874 was 41, with 215 teachers and 16,681 pupils. The system of public schools of Philadelphia was established on a free basis in 1818. It is supported by a city tax. The school houses are large, well built edifices, distributed so as to give access to them by the entire population. Text books are furnished by the city.—The Girard college for orphans was founded by Stephen Girard. The grounds are about 2 m. N. W. of Independence hall, bordering N. E. on Ridge avenue, and are surrounded by a high stone wall; they embrace upward of 40 acres. The main building, completed in 1847, is a splendid specimen of Corinthian architecture, of white marble. The roof commands a wide view of the city. In a room in the building, known as Girard's room, are preserved the books and personal effects of the founder. (See GIRARD, STE-



Girard College.

PHEN.) The grounds contain a monument to the graduates of the college who fell in the civil war. This institution is supported by the income of the residue of Girard's estate after the payment of certain specific legacies. The residuary estate is managed by the board of directors of city trusts, appointed by the judges of the court of common pleas, and on Dec. 31, 1874, amounted to $6,104,862 22. The total receipts during 1874, including $38,487 37 on hand at the beginning of the year, were $798,399 10; expenditures, $738,985 89, of which $174,073 40 were on account of the college and $564,912 49 on account of the estate, including investments, erection of buildings, &c. The institution can accommodate 550 pupils, and is now full. The number admitted from the opening of the college in 1848 to the close of 1874 was 1,796. The beneficiaries are white male orphans born in Pennsylvania, who are admitted between 6 and 10 years of age, and are maintained and educated in the institution until 18, unless sooner apprenticed to some trade or occupation. The course of study, arranged for 8½ years, embraces the English and scientific branches, besides French and Spanish. There are 24 teachers and 20 other officers. The polytechnic college of the state of Pennsylvania is situated in Market near 17th street. It was incorporated in 1853. This institution affords instruction in mechanics, engineering, geology, mineralogy, chemistry, mathematics, architecture, drawing, modern languages, bookkeeping, &c. The university of Pennsylvania occupies fine buildings recently erected near 36th and Locust streets in West Philadelphia, in two squares of over 16 acres, comprising a hall for the departments of arts, science, and law, the medical hall, and the university hospital. The site of the hospital was presented by the city on condition of the maintenance of 58 free beds for the indigent sick. The state granted $200,000 for its establishment, and $350,000 was obtained by subscriptions. The university had its origin in a charitable school established by subscription in 1745. The institution was founded as an academy in 1749, and incorporated in 1755 as "the college, academy, and charitable school of Philadelphia." In 1779 it was erected into a university, at which time the college separated from it, remaining distinct until 1791, when the present organization of the university was established. The medical department was founded in 1765, and the law department in 1789. The department of arts affords instruction in the usual collegiate branches, and the department of science in chemistry, mineralogy, geology, mining, metallurgy and assaying, engineering, drawing, and architecture. The regular course in each department is four years, but special and partial courses are allowed. Instruction in the medical department is given by the regular faculty and by clinical lecturers in the hospital during the autumn and winter. Instruction is also given during the spring and summer in certain collateral branches of science, by an auxiliary faculty organized in 1865. The regular course in this department and in the law department is two years. In 1874–'5 the number of instructors in the department of arts was 13, and of students 99, of whom 11 were pursuing partial courses; in the department of science there were 18 instructors and 116 students, of whom 16 were pursuing special and partial courses; in the law department, 5 professors and 59 students; in the charity schools, one for boys and one for girls, giving instruction in the English branches, 3 teachers and 136 pupils. In the medical department the regular faculty numbered 11, the auxiliary faculty 5, and the hospital faculty 12; total, deducting repetitions, 24. The number of students in the regular course was 371; in the auxiliary course, 101; total, deducting repetitions, 390. The whole number of professors in the university, deducting repetitions, was 41; of other instructors, 15; of students, 800. The number of volumes in the libraries was 18,000. In the department of science there are a collection of American fossils and a mineralogical cabinet, containing 10,000 specimens. The medical department also has a valuable museum and cabinets. The Wagner free institute of science, founded by Prof. William Wagner, occupies a fine building on the corner of 17th street and Montgomery avenue. It was incorporated and opened in



University of Pennsylvania.

1855; a supplementary act of incorporation was passed in 1864, and in that year the building now occupied was completed. It has a library of 16,000 volumes, and its cabinets of minerals, geological specimens, shells, dried plants, &c., are very valuable. There are six professors, and two courses of lectures, attended by from 500 to 1,000 persons, are annually delivered on chemistry, geology and palæontology, anatomy and physiology, astronomy, natural philosophy, and elocution and oratory. Instruction is also given in civil, mining, and steam engineering. The divinity school of the Protestant Episcopal church, in 39th and Walnut streets, West Philadelphia, was established in 1862. In 1874–'5 it had 6 professors, 36 students, and a library of 6,000 volumes. The theological seminary of the Evangelical Lutheran church, in Franklin street, was founded in 1864. In 1874–'5 it had 6 professors and a library of 2,500 volumes. The whole number of graduates was 103. There are three medical colleges, besides the medical department of the university, two dental colleges, and a college of pharmacy. These are the Jefferson medical college, in 10th street, between Chestnut and Walnut; the Hahnemann medical college of Philadelphia, in Filbert near 11th street, the oldest homœopathic college in the world; the woman's medical college of Pennsylvania, in College avenue near N. 22d street; the Pennsylvania college of dental surgery, in 10th and Arch streets; the Philadelphia dental college, in N. 10th street; and the Philadelphia college of pharmacy, in 10th street, near Race. The latest statistics of these institutions appear in the following table:

INSTITUTIONS.	Date of organization.	No. of instructors.	No. of students.
Jefferson medical college.....	1825	12	483
Hahnemann medical college..	1848	19	180
Woman's medical college.....	1850	14	50
Pa. college of dental surgery..	1856	8	59
Phil. dental college...........	1868	9	78
Phil. college of pharmacy....	1821	8	251

—The Franklin institute occupies a plain and substantial building in 7th street near Chestnut, containing a fine lecture room; it was incorporated in 1824, and is designed to promote manufactures and the mechanic and useful arts. It has a library, and maintains courses of lectures on different branches of science. The school of design for women in Penn square, founded in 1848, affords gratuitous instruction. The American philosophical society, in S. 5th street, was incorporated in 1780. It has a cabinet of coins and relics, and a library containing 15,000 pamphlets besides bound volumes. The academy of natural sciences, founded in 1812 and incorporated in 1817, has a valuable library and very extensive collections in zoölogy, ornithology, geology, mineralogy, palæontology, conchology, ethnology, archæology, and botany. Gratuitous instruction is given in natural science. Admission is obtained to the collection upon payment of a small fee. The building now occupied is on the corner of Broad and Sansom streets. A new and extensive building of serpentine stone with trimmings of Ohio sandstone, in the collegiate Gothic style, is in course of erection on the corner of 19th and Race streets. The academy of fine arts, in Broad and Cherry streets, was founded in 1805 and incorporated in 1807; it has very valuable art collections, and holds annual exhibitions. The building has a front of 100 ft. on Broad street and a depth of 258 ft. on Cherry street; it is of a modified Gothic style, and is profusely ornamented. The Handel and Haydn society, in Arch street, is chiefly devoted to music, but possesses a library of standard works. The historical society of Pennsylvania, in Spruce street, was incorporated in 1826; its library, containing besides bound volumes 40,000 pamphlets and 20,000 folios of manuscripts, is particularly rich in local and family histories. The numismatic and antiquarian society of Philadelphia, in Walnut street, has a library and a collection of 6,700 coins, medals, &c., chiefly ancient, and 800 antiques and medallions; it was incorporated in 1858. The American Baptist historical society, in Arch street, has a library containing besides bound volumes 16,000 pamphlets and 453 manuscripts. The Athenæum of Philadelphia occupies an imposing building in 6th and Adelphi streets; it has a fine library and a reading room supplied with the principal American and foreign newspapers and periodicals. The library company of Philadelphia was formed in 1731 by Benjamin Franklin and others; its library, commonly known as the Philadelphia library, is next to the mercantile the largest in the city; the building, in S. 5th and Library streets, was erected in 1789. The mercantile library, organized in 1821, belongs to shareholders, and is accessible to others upon the payment of annual dues; its reading room is supplied with the principal American and foreign newspapers and periodicals; the building, in 10th street above Chestnut, has a frontage of 74 ft. and a depth of 184 ft., and is one of the finest buildings for library purposes in the country. Other libraries are the apprentices' (free), established in 1821, in Arch street; that of the Catholic Philopatrian literary institute, in Locust street; the Dial library, in S. 5th street; that of the German society of Pennsylvania, in S. 7th street; of the library association of Friends, in Race near 15th street; of the mechanics' institute of Southwark, in S. 5th street; of St. Philip's literary institute, in Queen street; of the law association of Philadelphia, at 6th and Chestnut streets; of the Moyamensing literary institute, at S. 11th and Catharine streets; of the Spring Garden institute, at Broad and Spring Garden streets; and the Southwark library, in S. 2d street. The latest statistics of the libraries above mentioned are as follows:

LIBRARIES.	No. of vols.
Mercantile library	112,000
Library company of Philadelphia	100,000
Academy of natural sciences	26,000
Apprentices' library	20,000
Athenæum of Philadelphia	20,000
American philosophical society	15,000
German society of Pennsylvania	*15,000
Historical society of Pennsylvania	15,000
Pennsylvania hospital	13,000
Southwark library	8,000
Law association of Philadelphia	8,000
Library association of Friends	7,814
Franklin institute	7,500
American Baptist historical society	7,815
Spring Garden institute	5,728
Mechanics' institute of Southwark	3,650
Numismatic and antiquarian society of Phila.	3,500
Moyamensing literary institute	2,900
Handel and Haydn society	2,500
Catholic Philopatrian literary institute	1,500
Dial library	1,500
St. Philip's literary institute	1,500

—The Walnut street theatre, at 9th and Walnut streets, seating 1,500, is chiefly devoted to the standard drama; it has a front of 90 ft. and a depth of 146 ft., presenting from Walnut street a façade in marble of two stories, with a range of Doric columns. The principal other theatres are the Arch street, in Arch near 6th street, with a marble front, seating 1,800; the Chestnut street, in Chestnut near 12th street, one of the finest theatres in the country, seating 2,500; the American, in Chestnut near 10th street, seating 2,800; and the Grand Central, in Walnut near 8th street. The museum is in 9th and Arch streets. Minstrel entertainments are given in the Arch street opera house, in Arch near 10th street, and in the Eleventh street opera house, in 11th near Chestnut street. The academy of music, in Broad and Locust streets, seating 3,000, was opened in 1857; it has a front of 140 ft. and a depth of 238 ft. The exterior is of fine pressed brick, with handsome brown stone trimmings, the façade being in the Byzantine style. The interior is elaborately ornamented. It is chiefly devoted to operas and classic concerts. Classic music may also be heard in the musical fund hall, Locust near 9th street; in Concert hall, Chestnut near 12th street; and in Horticultural hall.—There are 105 newspapers and periodicals, viz.: 17 daily (3 German), 2 tri-weekly, 1 semi-weekly, 40 weekly (5 German), 6 semi-monthly, 37 monthly (1 German), and 2 quarterly.—The number of church organizations according to the census of 1870 was 388, with 424 edifices, 302,239 sittings, and $18,330,667 property. The statistics of the principal denominations are as follows:

DENOMINATIONS.	Organizations.	Sittings.
Baptist	48	32,800
Episcopal	68	44,061
Evangelical Association	8	2,950
Lutheran	27	17,800
Methodist	63	44,300
Presbyterian	67	66,378
Reformed (late Germ'n Reform'd)	13	10,050
Roman Catholic	37	50,000

* 8,000 German and 7,000 English.

The city directory enumerates 488 churches and missions, viz.: 61 Baptist, 3 Congregational, 2 Disciples of Christ, 90 Episcopal, 7 Evangelical Association, 14 Friends' (7 Hicksite and 7 Orthodox), 11 Jewish, 26 Lutheran (14 English and 12 German), 91 Methodist Episcopal (several colored), 1 Methodist Protestant, 4 Moravian, 77 Presbyterian, 4 Reformed (late Dutch Reformed), 15 Reformed (late German Reformed), 11 Reformed Presbyterian, 42 Roman Catholic, 2 Second Advent, 3 Swedenborgian, 2 Unitarian, 11 United Presbyterian, 3 Universalist, and 8 miscellaneous. —Philadelphia was founded by William Penn, as his first act in taking possession of the grant of a province by Charles II. He sent out a body of colonists in August, 1681, but the town was not laid out till near the close of 1682, Penn arriving meanwhile. The name was selected more because of its intrinsic significance than from historical regard to the city of that name in Asia Minor. The Swedes had settled in considerable numbers on both shores of the Delaware below the site of the city before Penn came, and several proprietors of Swedish origin at this time held small tracts on the present site of the city by titles derived from the Dutch and English governors of New York. None of these had serious difficulty with the proprietor of the province. Emigration to the colony was very rapid at the outset, 23 ships arriving in 1682. In 1682 and 1683, 357 houses were built. In 1683 and 1684 a large emigration arrived from Holland and Germany as well as from England and Wales. They were nearly all Friends, and the city continued to be almost exclusively occupied and controlled by Friends for half a century after it was founded. The population in 1684 was estimated at 2,500. In 1683 the first legislative assembly held in Philadelphia was convened, the first sheriff was appointed, and the first grand jury summoned. A court house was not completed till 1707. Penn presented Philadelphia with a city charter, Oct. 28, 1701. It prospered in a high degree, and was the most important city in the country during the colonial period and for more than a quarter of a century subsequent to the declaration of independence. In 1719 Andrew Bradford began to publish the "American Weekly Mercury." In 1741 the city was divided into 10 wards, which divisions were retained till 1854. In 1744 the population was estimated at 13,000. The first continental congress met in Philadelphia in Carpenters' hall on Sept. 5, 1774, and continued in session till Oct. 26, 1774. The second assembled in the state house on May 10, 1775, and on July 4, 1776, adopted the declaration of independence. Other sessions of congress were commenced here on March 4, 1777, and July 2, 1778. The British forces occupied the city from September, 1777, to June, 1778. A census was then taken by Gen. Cornwallis, and there were found to be 21,767 inhabitants and

5,470 houses; but the people were then much scattered. The battle of Germantown, Oct. 4, 1777, was fought within the present chartered limits of the city, 6 m. N. W. of the centre of the old city. Philadelphia was the capital of the colony and state of Pennsylvania till 1799, except during the British occupation. From 1790 to 1800 it was the seat of government of the United States. Its foreign commerce and general trade increased rapidly after the revolution, the domestic exports rising to $7,000,000 in 1793, and to $17,500,000 in 1796. In 1806 the export of foreign goods rose to $13,809,389, and the total export to $31,384,091. At the war of 1812 this commerce almost wholly ceased; in 1816 business and speculation revived, but the results were not fortunate, and direct external trade never recovered its former importance. Previous to 1839 the banking capital of Philadelphia was large, and for most of the period down to 1836 it was the monetary centre of the country. The first bank of the United States, established by act of congress in 1791, with a capital of $10,000,000, was located here; and the second bank of the United States was established here in 1816 with a capital of $35,000,000. The failure of the bank under its state charter in 1839, and the loss of its large capital, greatly weakened the financial strength of the city, and the monetary centre was permanently transferred to New York. The revulsion of 1837, and the subsequent financial depression, were severely felt, the recovery from them not being apparent till 1844. In 1793 the yellow fever made terrible ravages, nearly decimating the population, and driving great numbers into the country; and again in 1798 it was epidemic. In 1832 the Asiatic cholera was very destructive, the victims numbering 770. In 1835 riots were incited against the colored population, and in 1838 Pennsylvania hall, belonging to the anti-slavery societies and occupied by their meetings, was burned by a mob. In 1844 the districts of Kensington and Southwark were the scene of riots arising from the hostility between the Roman Catholics and "Native Americans;" the disturbance was protracted over a considerable time, two Catholic churches were burned, the military were called out, and some lives were lost. During the civil war Philadelphia was active in the cause of the Union, and furnished a large number of men to the federal armies.

PHILADELPHUS, a genus of shrubs popularly called mock orange, and sometimes syringa, a name the use of which should be discouraged, as it properly belongs to the lilac. The genus is now placed in the saxifrage family, and comprises shrubs with opposite leaves without stipules; their abundant white flowers, sometimes solitary, are usually in corymbs; the calyx having its tube coherent with the ovary, with four or five valvate lobes; petals four or five; stamens 20 to 40; styles three to five, the ovary with the same number of cells, becoming when ripe a pod which splits into as many pieces as there are cells. There are several species, natives of the southern Atlantic and Pacific states and of Japan, and these have varied much by cultivation; our native species are scentless or nearly so. *P. inodorus* has mostly entire ovate-oblong leaves, and small flowers; *P. grandiflorus* is a much taller shrub, with long and recurving branches, usually toothed leaves, and very large flowers; both are found from Virginia southward; *P. hirsutus* of North Carolina and Tennessee has small acute hairy leaves, and the small flowers solitary or two or three together; *P. Gordonianus* of Oregon so much resembles *P. grandiflorus* that it is suspected of being a variety of it; *P. Californicus* and *P. Lewisii* are also found on the Pacific coast; some of these, especially *P. grandiflorus* and *P. Gordonianus*, are cultivated for the abundance and beauty of their large pure white flowers, but neither is so common as *P. coronarius*, sometimes called the garland mock orange, which has been long in cultivation, and the native country of which is not well known; some refer it to Japan, and others consider it a native of southern Europe. It has erect branches, oblong-ovate leaves, which have exactly the odor and taste of cucumbers, and large clusters of cream-white flowers, which are exceedingly fragrant; there is a dwarf variety, and one with double flowers. These shrubs form such dense clumps that they require no special propagation other than to dig up an old stool and pull it apart.

Gordon's Mock Orange (Philadelphus Gordonianus).

PHILÆ, an island of the Nile in Upper Egypt, 5 m. S. of Asswan, in lat. 24° 1′ 34″ N., lon. 32° 54′ 16″ E. Its Egyptian name is Pilak, Ailak, or Manlek, "the place of the frontier." The Arabs call it Jeziret el-Birbeh. It lies between the S. extremity of the island of Elephantiné and the E. bank of the river, is a quarter of a mile long and about 500 ft. broad, and is covered with picturesque ruins of temples, mostly of the times of the Ptolemies, with additions by the Roman emperors. These are principally at the S. end of the island. The chief temple is that of Isis. The earliest name found in the ruins is that of

Nectanebo II., of the 30th dynasty. Philæ is celebrated for the grandeur of the surrounding scenery, especially when seen from the top of the propylæon tower, begun by Ptolemy Philadelphus, completed by his successors, and adorned with sculptures by the early Roman emperors. In front of the temple is the chapel of *Æsculapius*, and to the east and south are small temples of Athor.

Temple of Isis.

PHILARET (Basil Drozdoff), a Russian prelate, born near Moscow in 1782, died there, Dec. 1, 1867. He was a professor in the academy of St. Petersburg, and in 1812 became its rector, in 1817 bishop of Revel, in 1819 archbishop of Tver, and in 1821 metropolitan of Moscow. His eloquence was greatly admired by Alexander I. Under Nicholas he kindled the popular enthusiasm during the Crimean war, but the emperor was displeased with his independence, and deprived him of his vote in the synod. He fully recovered his influence under Alexander II., upon whom he urged the emancipation of the serfs. He was the first to promote Biblical researches among the Greek orthodox clergy. A second edition of his sermons was published at St. Petersburg in 1848–'60, in 3 vols.—Of three other distinguished prelates of the same name, one was archbishop of Rostov and subsequently patriarch of Moscow, and the father of the czar Michael Romanoff (1613–'45), the founder of the reigning Russian dynasty; the second (1778–1858) was metropolitan of Kiev, and author of a collection of Russian hymns (1860) and of "Lives of Russian Saints" (1861); and the third (1805–'66) archbishop of Kharkov, and a historian of the Russian church (5 vols., Moscow, 1857–'9) and of the ecclesiastical literature of Russia from 862 to 1858 (2 vols., St. Petersburg, 1860–'61).

PHILEMON, an Athenian comic poet, born probably at Soli in Cilicia or in Syracuse about 360 B. C., died in 262. He became a resident of Athens at an early age, and was the first writer of the new comedy in order of time, and inferior in celebrity only to Menander, from whom he bore away the palm of victory in several dramatic contests. He began to exhibit plays about 330 B. C., and produced 97, of which the titles of about 50 remain. It appears that he once went into voluntary exile on account of defeat in a dramatic competition; and also that he made a journey to the East, visiting Alexandria by invitation of Ptolemy, and meeting with some comical adventures, especially one with Magas of Cyrene, whom he had satirized in a comedy, and who took a contemptuous revenge by presenting him with a set of child's playthings when he visited his court. The fragments of his extant works are printed in the principal editions of Menander. Philemon's subjects are chiefly love intrigues, and his plays are remarkable for their wit and elegance.

PHILEMON, Epistle to, a canonical epistle of the New Testament, written, according to its own inscription and the constant tradition of the ancient church, by the apostle Paul. Eusebius and Jerome attest its universal reception as a Pauline epistle in the Christian world. In modern times the authenticity of the epistle has been questioned by Baur (*Paulus der Apostel Jesu Christi*, 1845), but it is defended even by a majority of the theologians of the Tübingen school. The Epistle to Philemon is one of the shortest portions of the Bible, containing only one chapter. It was written about A. D. 63, during Paul's confinement at Rome, or according to some at Cæsarea. Philemon, according to ancient tradition, was a rich and influential citizen of Colossæ, and had been converted to Christianity under the preaching of Paul. The apostle writes to him about Onesimus, a slave of Philemon, who had run away from his master, had been converted by Paul at Rome, and was sent back by him to his master, who is entreated to receive him "not now as a servant, but as a brother beloved." Many writers have remarked the high courtesy and dignity with which the apostle asks for Onesimus the kind treatment which he might have commanded. Of the life of Philemon nothing else is known. According to a tradition he was bishop of Colossæ, where, it is said, his house was pointed out in the 5th century. The Roman Catholic church commemorates him as a saint on Nov. 22. Special commentaries on the epistle have been written by Hagenbach (1829), Koch (1846), F. Kühne (1856), H. B. Hackett (New York, 1860), J. J. Van Oosterzee in Lange's *Bibelwerk* (1862), and Bleek (1865).

PHILEMON AND BAUCIS. See BAUCIS.

PHILIDOR. See DANICAN.

PHILIP, one of the twelve apostles, born in Bethsaida, died probably at Hierapolis in Phrygia. Being a townsman of Peter and Andrew, he was also probably a disciple of John the Baptist. He is mentioned as the fourth called by Christ to the apostleship; he was the first to whom Christ said, "Follow me;" and his name is fifth in the list of the apostles. He is mentioned in connection with the multiplication of the loaves and fishes (John vi.), and with the introduction of strangers to Jesus at the feast of the passover in Jerusalem (John xii. 20–22). He said to Jesus (John xiv. 8): "Lord, show us the Father, and it sufficeth us." He was with the assembled apostles on the day of the resurrection, at the ascension, and on the day of Pentecost. The Acts of the Apostles do not say where Philip preached the gospel. Theodoret and Eusebius affirm that it was in Phrygia. Clement of Alexandria mentions his having a wife and three daughters; and Polycrates, bishop of Ephesus, says he died peacefully at Hierapolis. The *Acta Philippi* is wholly apocryphal. Philip the Apostle has been confounded with Philip the Evangelist, one of the seven deacons mentioned in Acts vi. The feast of St. Philip, together with that of St. James, is celebrated by the Latin church on May 1, and by the Greek church on Nov. 14.

PHILIP II., the 18th king of Macedon, counting from Caranus, born in 382 B. C., assassinated at Ægæ in August, 336. The accounts of his early life are in many respects contradictory. He was the youngest son of Amyntas II. and Eurydice. He spent his early youth at Thebes, either as a hostage given up by Ptolemy, the Macedonian regent, to Pelopidas as security for the tranquillity of Macedonia, or to insure his own safety from his mother and her paramour, who might have sought to change the succession. Other reasons for his residence there are also given by historians. He remained at Thebes two or three years, a time which he seems to have well employed in acquiring higher military knowledge. When his brother Perdiccas had slain Ptolemy Alorites and had ascended the throne, he presented Philip, on the advice of Plato, with the government of a subordinate district. In 360 or 359 Perdiccas was slain in a battle with the Illyrians, and left the government in a distracted state. Besides the infant son of Perdiccas, the legal heir to the throne, there were claiming it Philip's three half brothers, Archelaus, Arrhidæus, and Menelaus; Pausanias, aided by a Thracian prince; and Argæus, assisted by the Athenians. Moreover, the country was threatened by incursions from the neighboring warlike tribes of Illyrians, Thracians, and Pæonians. Philip at first took charge of the government for his nephew Amyntas, but shortly after, probably in 359, ascended the throne, and immediately took vigorous measures to relieve himself from his difficulties. One of his half brothers he put to death; the other two saved themselves by flight. The Illyrians were bought off with presents and promises. The Athenians he contrived to withdraw from the support of Argæus, by removing his garrison from Amphipolis and declaring it a free city; and when that leader returned from his unsuccessful march upon Ægæ he was met at Methone by Philip and completely routed. He sent the Athenian prisoners home, and made a treaty of peace with Athens. He next subdued Pæonia, and reduced Illyria as far as Lake Lychnitis. In 358 he began the siege of Amphipolis; and when ambassadors from that city implored the aid of the Athenians, their efforts were counteracted by the Macedonian envoys, who promised that the place if taken should be given up to Athens. Amphipolis fell, and Philip thus secured a convenient maritime port, commanding the country east of the Strymon, and in particular the gold region near Mt. Pangæus. The Athenians he continued to deceive with the promise of surrendering the city into their hands; and when the Olynthians, who now began to dread his growing power, sent embassies to Athens proffering an alliance, his partisans succeeded in having their proposals rejected. But while Athens was engaged in the social war, he suddenly formed an alliance with the Olynthians, and ceded to them Anthemus and Potidæa, the latter of which he had reduced. He had previously captured Pydna for himself, and although the siege of these places lasted long enough for aid to arrive from Athens, none came. Extending his conquests east of the Strymon, he took possession of the mining country opposite Thasos, and enlarged the city of Crenides, changing its name to Philippi. In the summer of 356, not long after the taking of Potidæa, three messages reached Philip at once, informing him of the birth of his son Alexander, the defeat of the Illyrians by his general Parmenio, and the victory of one of his horses in the Olympic games. For a time he now laid aside active operations, but about 353 he began the siege of Methone, the only possession which Athens now held on the Thermaic gulf. After a vigorous defence the city surrendered, and Philip extended his incursions into Thrace, marching as far as Maronea, where he entered into negotiations against Athens with the Thracian prince Kersobleptes. He also threatened the Athenian possessions in the Chersonese, but was unable to reach them on account of the hostility of Amadocus, another Thracian prince. Turning his attention to Thessaly, he marched to the assistance of the Aleuadæ of Larissa against

Lycophron, the tyrant of Pheræ; and the latter implored the aid of Onomarchus, leader of the Phocians, who sent into Thessaly his brother Phayllus with 7,000 men. Philip defeated and drove him out of the country, whereupon Onomarchus, taking the field in person, marched into Thessaly, and routed the Macedonians in two battles, with a loss so great that they were forced to withdraw into their own territory. After considerable difficulty in reviving the courage and devotion of his soldiers, Philip marched again into Thessaly, and, at the head of an army of 20,000 foot and 3,000 horse, signally defeated Onomarchus on the southern coast. He followed up this victory by the capture of Pheræ, which he made a free city, and of the maritime station of Pagasæ. On his march into Thessaly, the sacred war between Phocis and Thebes having broken out, he had proclaimed himself the avenger of the Delphian god, and before the battle had decorated his soldiers with laurel wreaths. He now pushed on to the Phocian territory under the pretext of punishing the sacrilegious robbery of Delphi; but his entrance into that country was prevented by the Athenians, who guarded the pass of Thermopylæ. He now advanced toward the Chersonese. The Athenians made immediate efforts to equip a fleet for the defence of their possessions in that vicinity, but on a false report of his death they allowed their military operations to languish. About this time Demosthenes delivered his first philippic. Meanwhile the Olynthians, who had formerly been allies of Philip, now began to fear his power, and concluded a treaty with Athens. No offensive operations on his part seem to have been begun until the middle of 350, when he seriously set to work to reduce the whole peninsula of Chalcidice, the pretext for the war against Olynthus being that his two half brothers had obtained a refuge in that city. The success of his arms in the peninsula was gradual but certain. City after city yielded to his power or was betrayed into his hands; and at last, master of Chalcidice, he marched directly against Olynthus and its two confederates, Apollonia and Methone. Near the last named place he was wounded and lost the sight of one eye. Athens sent an expedition to the assistance of its ally, but the reënforcements were not sufficient. Olynthus was taken, probably early in the spring of 347, nearly as much by the use of money as by actual military strength. The inhabitants were sold into slavery, and Olynthus itself and the other cities of Chalcidice, 32 in all, were dismantled, and so thoroughly ruined that, according to a speech of Demosthenes five years later, their very sites were scarcely discernible. Athens now made a vigorous effort to unite the states of Greece in a common league against Macedon; but failing of much success, she listened to the overtures of peace which Philip indirectly offered. Negotiations were opened, which were skilfully protracted by Philip so as to subserve his own interests. The first embassy left Athens about December, 347, and returned about the beginning of March, bringing back a letter professing the most friendly feelings, but insisting as a condition of peace that each party should retain what it possessed. The treaty was adopted, but a dispute arose on the question of who were the allies included in the terms of the peace, the envoys of Philip refusing to acknowledge the Phocians as such. Before the second embassy reached him, he had conquered Kersobleptes, the Thracian ally of Athens. He delayed the ratification of the treaty under various pretexts until he was at Pheræ, within three days' march of Thermopylæ. The Athenians, persuaded by Æschines and others, did nothing for the defence of the pass. Phalæcus, the nephew and successor in command of Phayllus, thereupon concluded an agreement with Philip to evacuate the territory, and the country fell immediately into the hands of the Macedonians. The amphictyons, assembling, invested Philip with the right of suffrage previously enjoyed by the Phocians, thus recognizing the Hellenic character of his nation; they moreover appointed him president of the Pythian games, which were held in August, 346, two months after the subjugation of Phocis. Athens, indignant at being betrayed, was not disposed to concur in the vote giving him a place in the amphictyonic assembly, but was persuaded by Demosthenes not to display an anger at once dangerous and impotent. Master of Thermopylæ, Philip now began his intrigues in the Peloponnesus, striving to excite the Messenians, Megalopolitans, and Argives against the Spartans. His active spirit was constantly at work throughout the whole of his dominions, confirming his authority in Thessaly, overrunning Pæonia and the Illyrian countries bordering on Macedonia, and capturing cities on the Ambracian gulf. In 344 Athens sent unsuccessful embassies into the Peloponnesus to counteract his efforts. Ill feeling prevailed between the Athenians and Macedonians for a long time before it broke out into open war. Philip began the siege of Perinthus in 340, but an Athenian fleet compelled him to retire; and a similar attempt to capture Byzantium failed in consequence of the presence of a fleet under Phocion, who moreover gained several advantages over him in land and naval actions. Philip therefore made peace with the Byzantines, withdrew his forces from that part of the country, and in the spring of 339 made a successful land expedition against the Scythian king Atheas; but on his return he was attacked by the Triballi, a Thracian tribe, was defeated with the loss of his booty, and received a severe wound in his thigh. About this time the amphictyons brought a new war into Greece, by resolving that the Amphissian Locrians, who had settled on the Cirrhæan plain, consecrated to the Delphian god, were to be punished for impiety. Philip was called in to execute the decree. He immediately began the march southward, and on his passage through Phocis seized Elatea and began refortifying that town. He declared his purpose to invade Attica, and sent envoys to Thebes, where a strong feeling against Athens prevailed, asking her assistance, or at least that a free passage through Bœotia should be granted. By the eloquence of Demosthenes, Thebes was persuaded to enter into an alliance with Athens, and the allied forces kept the field against Philip during the autumn and winter of 339 and 338, and gained several advantages over him. In August, 338, the battle of Chæronea was fought, in which Philip was signally victorious. The conquered Thebans he treated with severity, but motives of policy led him to adopt mild measures in regard to the Athenians, between whom and himself the treaty called the peace of Demades was negotiated, by which the Athenians recognized Philip as the head of Greece. He now reduced the entire Peloponnesus, with the exception of Sparta, which he did not attack. He held a congress of Grecian cities at Corinth, in which he unfolded his design of invading the Persian empire, and liberating the Asiatic Greeks. The congress voted him the leader of the Greeks, and decreed that the various states should furnish contingents. During 337 his preparations went steadily on, and early in 336 a body of troops under Attalus and Parmenio was sent over into Asia. Not long before he had repudiated his wife Olympias, the mother of Alexander, on the ground of infidelity, and had married Cleopatra, the niece of Attalus. To retain the good will of the king of Epirus while he himself was in Asia, Philip gave him his daughter in marriage; and festivities of great splendor were celebrated at Ægæ in Macedonia. Among the members of his body guard was a noble youth named Pausanias, who had vainly implored Philip to avenge an outrage committed by Attalus. His determination to assassinate Philip is said to have been encouraged by Olympias. As Philip was entering the theatre, Pausanias rushed forward and thrust a sword through his breast, killing him almost instantly. The assassin was overtaken and slain on the spot.

PHILIP V., king of Macedon, son of Demetrius II., born in 237 B. C., died in 179. His father died when he was eight years old, but he did not succeed to the throne until the death of his uncle Antigonus Doson in 220. In the first year of his reign he was brought into the war then raging between the Ætolians and the Achæan league. Marching to Corinth with an army for the support of the latter, he presided over an assembly of the allied states in which war was declared against the Ætolians, and in the spring of 219 entered Epirus, but quickly returned to repel an invasion of the Dardanians. At the close of the year he suddenly showed himself in the Peloponnesus, and in a short campaign defeated an Ætolian and Elean army under Euripidas, captured Psophis, ravaged the Elean plain, and conquered Triphylia. He then suddenly passed over into Ætolia, and took Thermum, the capital of that country, with all its treasures; and then, turning to the Peloponnesus, ravaged Laconia and defeated the Spartans under Lycurgus. In 217 he captured Bylazora in Pæonia, and reduced the Phthiotic Thebes in Thessaly, but finally concluded a peace, by which it was agreed that each party should retain what it possessed. At this time Philip began to turn his attention to the war then waged in Italy by Hannibal, and after the battle of Cannæ sent a messenger to conclude an alliance with the Carthaginian leader; but owing to the ambassador being intercepted by the Romans, the treaty was not made till 215. In 214 his fleet appeared in the Adriatic, took Oricum, and laid siege to Apollonia, but was obliged to retreat on the arrival of a Roman force under Lævinus. The next year he took Lissus and reduced the greater portion of Illyria. Meanwhile the character of Philip seems to have undergone a great change. In the beginning of his reign he had not only manifested military talents of a high order, but had been so distinguished for his moderation and generosity that the cities of Crete had placed themselves of their own accord under his protection. But now he quarrelled with Aratus, his former friend and counsellor, and ravaged Messenia with fire and sword. In 211 an alliance was entered into against him by the Romans, the Ætolians, Scerdilaidas, king of Illyria, and Attalus, king of Pergamus. The war began in 210 and lasted till 205; and upon the whole Philip was successful. The terms of the treaty concluded with the allies were not much respected by the Macedonian king, who formed an alliance with Antiochus the Great of Syria against Egypt; and having inflicted much injury on the Rhodians, he became involved in a war with them and Attalus. While besieging Chios, he was attacked and defeated by the combined fleet; but in another engagement off Lade he was successful. The allies equipped another fleet, and it was with some difficulty that Philip was able to pass over into Europe in the spring of 200. The Romans, now free from their war with Carthage, declared war against Macedon. In 200 Philip invaded Thrace, took Ænus and Maronea, penetrated into the Chersonese, captured Abydos, and returning entered Attica, nearly surprising Athens; but being foiled in this, he laid waste the country around the city. The following year he defeated the Ætolians, who had joined the Romans. The arrival of Titus Quintius Flamininus to take the command of the Roman army soon changed the aspect of affairs. A battle was fought in 197 at Cynoscephalæ in Thessaly, in which the Macedonians were defeated with a loss of 8,000 men killed and 5,000 taken prisoners. A peace was concluded in 196, according to the terms of which Philip was required to give up all his conquests in

Europe and Asia, surrender his fleet to the Romans, reduce his standing army to 5,000 men, and pay the sum of 1,000 talents. One of the hostages for the fulfilment of these terms was his son Demetrius. Philip now acted outwardly as a zealous ally of the Romans, assisted them in their war against Nabis, king of Sparta, and subsequently not only refused to join Antiochus, but aided the Romans in their war with that monarch. So thoroughly were they satisfied with his conduct, that the portion of the fine unpaid was remitted, and his son Demetrius was sent home. But after the defeat of Antiochus they grew jealous of Philip, who was strengthening his power in every quarter. He was compelled to give up all his conquests in Perrhæbia and Thessaly, remove his garrisons from the cities of Thrace, and restrict his authority to the ancient boundaries of Macedonia. Demetrius was sent to Rome, and procured such advantageous terms that the jealousy of his brother Perseus was excited. The life of Philip was henceforth embittered by the dissensions between his two sons. In his domestic administration he also became more cruel, while he was engaged in secret preparations for renewing the war against the Romans. In an expedition into Pæonia, Perseus by means of forged letters induced his father to put Demetrius to death. The unhappy king was now overcome with grief and remorse. He thought he was haunted by the avenging spirit of Demetrius, and not long after died, in his last moments cursing his son Perseus.—Polybius said of Philip, that there were few monarchs of whom more good or more evil could justly be spoken. He was a ready speaker, and possessed great power of repartee. He was exceedingly licentious, and fond of excessive drinking.

PHILIP (Augustus) II., king of France, the seventh monarch of the Capetian line, born in August, 1165, died in Mantes, July 14, 1223. He was the son of Louis VII., and was crowned at Rheims during the lifetime of his father, whom he succeeded in 1180. His marriage with the daughter of the count of Hainaut united the races of Capet and Charlemagne, and a second coronation was performed at St. Denis. He immediately banished all the Jews, confiscated their property, and persecuted the Waldenses. When his wife died without issue, the count of Flanders, her uncle, refused to give up Amiens, a part of her dowry, and a war broke out, in the course of which the count marched to the gates of Paris (1184); but Philip ultimately secured Amiens and nearly all of Vermandois. He was next involved in a war with the duke of Burgundy, who disputed his authority, and with Henry II. of England, whose sons he supported against their father. In 1188, on hearing of the fall of Jerusalem, he assumed the cross, and in 1190 the allied forces of France and England started on the third crusade. They reached the Holy Land in 1191, but, outshone by his rival Richard I., Philip soon returned to Europe, swearing on his departure to respect the dominions of the English king. Nevertheless, he soon found a pretext for invading Normandy, and made some conquests, while Richard was a prisoner in the hands of the emperor of Germany; but in 1193 he was repulsed from Rouen. After Richard's release a war, marked by no great military or political events, began between the two monarchs, and lasted till the death of Richard in 1199. The statesmanship of Philip in the end proved too much for the more soldierly qualities of the English king. During this war Philip recalled the Jews, being in need of money. Having divorced his second wife, and, in defiance of a papal bull, married in 1196 Agnes of Meran, a princess of the Tyrol, he was excommunicated, and his kingdom laid under an interdict. The death of Agnes enabled him to reconcile himself with the church, and the murder of Arthur by King John afforded him a plausible pretext for renewing the war with England. He summoned John to appear at his court and answer for the crime, and on his failing to do so adjudged him guilty of felony, and declared his dominions confiscated. Normandy, Maine, and Anjou were conquered in 1203–'4; and though Poitou and Guienne were not effectually subdued until the reign of Philip's son, the power of the English was broken. In 1206 a truce of two years was concluded, which Philip employed in strengthening his power and developing the material resources of his dominions. About this time the crusade against the Albigenses began in the south of France, where the king scarcely exercised even nominal authority. Its early success encouraged the pope to excommunicate John, with whom a dispute had arisen, and to present England to Philip. Immense preparations were made for an invasion, but the French king was diverted from the execution of his purpose by the insubordination of Ferdinand, count of Flanders. He invaded the dominions of his vassal in 1213, and committed great ravages; but his fleet was defeated and destroyed at Damme by the English, under command of the count of Boulogne and the earl of Salisbury. The next year he was attacked on the side of Poitou by John, and on the side of Flanders by the nobles of the Low Countries commanded by Otho, emperor of Germany. John was beaten off by the dauphin Louis, and Otho was defeated in the battle of Bovines between Lille and Tournay, in which the counts of Boulogne and Flanders were taken prisoners. After this the life of Philip is marked by no events of great military importance, except the abortive expedition of his son Louis (afterward Louis VIII.) to England, to take possession of the crown of that country, on the invitation of barons opposed to King John. Philip amassed great wealth, which he divided among several legatees. He was the ablest king that had sat on the throne of France since the time of Charlemagne. The kingdom, limited at his accession to the Île de France and portions of Picardy and Orléanais, included in 1206 in addition all or nearly all of Vermandois, Artois, the Vexin-Français and the Vexin-Normand, Berry, Normandy, Maine, Anjou, Touraine, Poitou, and Auvergne. But it was less as a soldier than as an administrator that he was distinguished. He succeeded in part in establishing a central power by assembling about him a parliament of his grand vassals, of which he himself as suzerain was the head. He was still more successful in his efforts to free royalty from the power either of the pope or of the national clergy. In 1209 he seized the domains of the bishops of Orleans and Auxerre, who had refused their contingent dues for the fiefs they held, and, in spite of a papal interdict, compelled the prelates to admit his claim. He caused the streets of Paris to be paved, extended and heightened the walls, constructed numerous public buildings, conferred its chief privileges upon the university of Paris, and walled in and strengthened other principal towns.

PHILIP IV., the Fair, the 11th king of France of the Capetian line, born at Fontainebleau in 1268, died there, Nov. 29, 1314. He succeeded his father, Philip the Bold, in October, 1285, and was crowned at Rheims, Jan. 6, 1286. The beginning of his reign was disturbed by the war with Aragon, begun in 1283, but this was speedily settled. He had long been meditating the invasion of Guienne, then held by Edward I. of England, when in 1293 a sort of piratical war waged between the sailors of the cinque ports and France gave him a pretext for summoning that monarch before the parliament of Paris. The English king, acknowledging the suzerainty of Philip, but detained by his contests with the Welsh and Scotch, sent his brother Edmund with full power of negotiation; and this credulous prince was so outwitted through a fictitious treaty, that the surrender of all the fortresses in Guienne was procured. Philip then charged Edward with contumacy for not appearing in person, and declared his fiefs confiscated. The latter formed an alliance with the German emperor, Adolphus of Nassau, and the count of Flanders. A truce was however agreed upon, by the terms of which the question of Guienne was referred to the decision of the pope. In 1299-1300 Flanders, which had not been included in the treaty, was reduced, and its count enticed to Paris and imprisoned. Philip now engaged in a quarrel with Pope Boniface VIII., and in 1302 summoned a meeting of the states general. A rebellion broke out in Flanders, and in attempting to suppress it the French were defeated with terrible slaughter at Courtrai, July 11, 1302. The next year Philip marched into the Flemish territory at the head of a large army, but was unable to effect anything; and about this time the expulsion of the French garrison from Bordeaux led to the restoration of Guienne to England (1303), and to a treaty of peace between the two crowns. In the mean while, his quarrel with the pope continuing, Philip summoned a meeting of the prelates and nobles, and accused Boniface of heresy, simony, sorcery, sensuality, and disbelief in the eucharist and in the immortality of the soul. An appeal to a general council was adopted. But Philip, trusting more to force than to pacific measures, sent into Italy Guillaume de Nogaret, who by the aid of the Colonnas made the pope prisoner; and although Boniface was released by a rising of the people, he shortly afterward died, probably from ill usage. He was succeeded by Benedict XI., who did not live long, and in turn was succeeded by Clement V., a pontiff wholly in the French interest, who transferred the papal residence to Avignon. Philip now prosecuted his Flemish war, but with little success, and a treaty of peace was finally concluded in 1305, by which the independence of Flanders was partially recognized. Actuated, it is supposed, by want of money, which had previously led him to persecute the Jews and depreciate the coinage, Philip next resolved to suppress the order of the templars. Charges of heresy and unnatural crimes were brought against the body, and in October, 1307, all the knights of the order were arrested on the same night. Condemned by diocesan tribunals, numbers of them were burned, and others, who through fear of torture or death had confessed, were sentenced to minor punishments. To sanction the suppression of the order, the council of Vienne assembled in October, 1311, and in the spring of 1312 the pope pronounced it dissolved, and its property was made over to the hospitallers, but the crown absorbed the greater portion of it. In 1314 two leading officers of the templars, Guy of Auvergne and the grand master Jacques de Molay, were burned for recanting their confessions; and on this occasion, it is said, the grand master summoned the pope and the king to appear before the judgment seat of God, the former within 40 days, the latter within a year and a day. Whether this summons was real or not, both sovereigns died within the stated periods. The last years of Philip's life were taken up with the collection of taxes, and prosecutions and executions for political offences. In 1313 the wives of his three sons were charged with adultery; one of them was sentenced to perpetual imprisonment, and one, Margaret of Burgundy, wife of his eldest son Louis, was strangled in prison, while the third was acquitted. Involved in new difficulties with the Flemings, he was obliged by an insurrection of his own people to make a compromise with them. His power was most despotic, and there was often much disaffection among the people in consequence of the enormous taxes and debasement of the coinage.

PHILIP VI., of Valois, the first king of France of the house of Valois, born in 1293, died at Nogent-le-Roi, near Chartres, Aug. 22, 1350. He was the son of Charles of Valois, brother of Philip the Fair, and during the reign of Philip the Long headed an unsuccessful expedition against the Ghibelline party in Lombardy. On the death of Charles the Fair in 1328 without a male heir, though his widow was pregnant, Philip was intrusted with the regency. When the queen was delivered of a daughter, who by the Salic law was excluded from the throne, the right to the succession became a matter of dispute; but at last it was settled on Philip, who was crowned at Rheims, May 29, 1328. The same year he undertook an expedition against the Flemings, whom he defeated with considerable loss, and took the city of Cassel. The next few years were occupied in the civil administration of France, regulating the currency, settling disputed boundaries, and especially in determining the claims of Robert, count of Beaumont, to Artois. The assistance which Philip rendered in 1337 to David Bruce, king of Scotland, irritated Edward III. of England, who claimed to be the heir of the French throne; and a war broke out in 1339, Edward having formed an alliance with the Flemish burghers under Jacob van Artevelde. This war, which lasted through the reign of Philip, proved most disastrous to the French. In 1342 Philip issued an ordinance making salt a government monopoly. In August, 1346, he was defeated at Crécy by Edward III., who took Calais the next year. In 1348 the ravages of the plague prevented a general renewal of the war. Philip was somewhat compensated for his losses both from war and disease by the addition to the French dominions of the province of Dauphiné. In 1350 he espoused the princess Blanche of Navarre, but soon after died. He was succeeded by his son John the Good.

PHILIP I., called the Handsome, archduke of Austria and king of Castile, born in Bruges, July 22, 1478, died in Burgos, Sept. 25, 1506. He was the son of the archduke of Austria, afterward the emperor Maximilian I. of Germany. By the death of his mother, Mary of Burgundy, in 1482, he became duke of Burgundy and sovereign of the Low Countries. In 1496 he married Joanna, called the Mad, second daughter of Ferdinand and Isabella of Spain. Three heirs to the throne of Aragon and Castile, whose claims took precedence of Joanna's, having died, she and Philip were proclaimed heirs, and in 1501 left Flanders for Spain. In 1502 their claims were acknowledged by the cortes of the two Spanish kingdoms. Philip soon after returned to Flanders, leaving his wife in Spain. She followed him the next year, and on the death of Isabella in 1504 Philip in right of his wife assumed the title of king of Castile. Toward the close of 1505 they embarked for Spain, but were driven by storms on the coast of England, where they were detained for three months by Henry VII., and were forced to sign treaties advantageous to that monarch. Ferdinand had been appointed regent of Castile by the will of Isabella, and endeavored to retain his power. The greater part of the nobility of Castile declared in favor of Philip and Joanna, and Ferdinand was compelled to retire to his kingdom of Aragon. Philip now abandoned himself to dissipation, and soon died of a fever brought on by his excesses. He was the father of Charles I. of Spain and V. of Germany, of the emperor Ferdinand I., and of four daughters who became queens.

PHILIP II., king of Spain, born in Valladolid, May 21, 1527, died in the palace of the Escurial, Sept. 13, 1598. His father was Charles V., emperor of Germany and king of Spain, and his mother the empress Isabella, daughter of Emanuel the Great of Portugal. He was carefully educated, and showed some taste for science and the fine arts, especially for mathematics and architecture. At the age of 16 he was married to his cousin the infanta Maria, daughter of John III. of Portugal, who died within two years, a few days after giving birth to Don Carlos. Philip was married a second time, July 25, 1554, at Winchester, to Mary, queen of England. To make the husband equal to the wife in rank, Charles resigned to his son the kingdom of Naples and the duchy of Milan. The marriage was not happy, for Mary was very homely, and Philip, though she doated on him, treated her with coldness and was notorious for his infidelities. After a residence of somewhat more than a year in England, he was summoned to Flanders by his father, and in September, 1555, reached Brussels, where on Oct. 25 was fulfilled the famous act of abdication by which Charles transferred to Philip the sovereignty of the Netherlands. On Jan. 16, 1556, the emperor ceded to his son all his remaining hereditary dominions, and shortly afterward resigned the elective crown of the German empire in favor of his brother Ferdinand. Philip thus became sovereign of the most powerful and extensive empire in the world, including, besides the Netherlands, a great part of Italy, the whole of Spain, and the vast Spanish possessions in America, Africa, and the East Indies. He is described at this time as a small, meagre man, much below the middle height, with thin legs, a narrow chest, and the shrinking timid air of a habitual invalid. He had the face of a Fleming with the manners of a Spaniard. He looked constantly on the ground when he conversed, was chary of speech, and embarrassed and even suffering in manner. He was considered by his contemporaries to be deficient in mental capacity; but he had an inclination for business amounting almost to a passion, and was an indefatigable writer of despatches, spending nearly all his time in his cabinet with his ministers and secretaries. His main object in life was to support and advance the Roman Catholic religion. His ambition for the aggrandizement of his empire was generally subordinate to his concern for the church; and he was accustomed to say, "Better not reign at all than reign over heretics." But although his piety and his position at the head of the Roman Catholic princes of Europe made him the natural ally of the pope, one of the first events of his reign was a war with Paul IV., who then occupied the papal throne. The pope had formed an alliance with Henry II. of France and with Solyman the Turkish sultan, the latter of whom agreed to make a descent on the Italian dominions of Philip, while a powerful French army led by the duke of Guise entered Italy for the conquest of Milan and Naples. Philip had intrusted the government of the latter kingdom to the duke of Alva, and that able soldier in one campaign carried his arms to the walls of Rome, and in another drove the French out of Naples and compelled the pope to sue for peace, which was concluded Sept. 14, 1557. Meantime Philip in person was vigorously prosecuting hostilities in the northern provinces of France, having by his influence with Mary induced England to declare war against that country. Under his direction a powerful army, the actual commander of which was Emanuel Philibert, duke of Savoy, assisted by William of Orange, Egmont, and other officers of distinction, entered Picardy and laid siege to St. Quentin. A French army, attempting to relieve the place, was defeated, chiefly by the brilliant valor of Egmont, in a battle fought Aug. 10, 1557, the day of St. Lawrence; and in honor of that martyr, to whose interposition he ascribed the victory, Philip subsequently built the convent and palace of the Escurial. The town of St. Quentin was taken by storm soon after the battle. Other victories over the French rapidly succeeded, but the jealousies of his English and German allies prevented Philip from prosecuting his conquests by marching on Paris. In the following year the French invaded Flanders, and were signally defeated in the battle of Gravelines by a Spanish and Flemish army commanded by Egmont, who much enhanced by this achievement the reputation he had gained in the campaign before St. Quentin. These victories led to the treaty of Cateau-Cambrésis (April 2, 1559), which was highly favorable to Philip, and greatly raised his reputation in Europe as a sovereign and a diplomatist. While negotiations were going on his wife Mary of England died, Nov. 17, 1558. Philip soon made offers of marriage to her successor Elizabeth, which were rejected. He did not take the refusal greatly to heart, and speedily obtained the hand of the princess Elizabeth, or Isabella, daughter of Henry II. of France, who at the late treaty had been promised to Philip's son Carlos, the prince and the princess being at that time both about 14. The marriage was celebrated at Paris, June 24, 1559, the duke of Alva acting as his sovereign's proxy. A few weeks later Philip sailed from the Netherlands to Spain, where he afterward always resided, and where he was joined by his bride early in the following year. He left the government of the Netherlands in the hands of his half sister Margaret, duchess of Parma, as regent, assisted by a council composed in part of William of Orange, Count Egmont, and Antoine Perrenot, bishop of Arras, subsequently better known as Cardinal Granvelle. Philip had not been many days in Valladolid, where the court then resided, before he signalized his devotion to the church by attending an *auto da fé*, at which 14 Protestants were burned at the stake, two of them men of high rank and distinguished talents. Soon after his return to Spain he began to take measures for extirpating heresy in the Netherlands. For this purpose he had in conjunction with the pope added 13 new bishoprics to the four already existing in these provinces, and made Mechlin the seat of an archbishop with the dignity of primate. The popular opposition to this and other measures of the Spanish court was led by Orange, Egmont, Horn, Montigny, and other eminent and influential nobles, some of whom were Catholics. Their energetic protests compelled Philip in 1564 to withdraw Granvelle from the country, the odium of these proceedings being popularly fixed on that prelate. But the persecution of the Protestants was continued, and 17 persons were publicly burned at the stake in 1564. The people at length rose in insurrection, and in 1567 the duke of Alva was sent with a powerful army to repress the rebellion and extirpate the heretics. Under his rule the most terrible barbarities were inflicted on the Protestants. Egmont and Horn and several other great nobles were beheaded, and during his administration of six years 18,000 persons perished on the scaffold, besides immense numbers killed in battles, sieges, and massacres. This ferocity failed to subdue the insurgents, who under the wise leadership of William of Orange maintained a heroic and generally successful struggle against Alva and his successors, Requesens, Don John of Austria, and the duke of Parma. In 1579 the seven United Provinces formed the union of Utrecht, and during the rest of Philip's reign maintained their independence and carried on a vigorous war with the Spaniards by land and sea. Among the remarkable incidents of this long contest was the assassination of William of Orange, the great leader of the revolt of the Netherlands, at Delft in 1584. The deed was incited by a proclamation of Philip offering inducements for its commission; and although the assassin, Balthasar Gérard, was taken and put to death, Philip rewarded his heirs with estates of great value and with patents of nobility. During the earlier part of the war with the Netherlands, Philip carried on almost constant hostilities against the Mohammedans. The famous siege of Malta by the Turks in 1565 was raised by his forces sent from Sicily. His persecution drove the Moors of Granada to a revolt in 1568, which was suppressed with rigor. It was followed in 1571 by a war with the Turks, the principal event of which was the great naval victory of Lepanto, won by Philip's half brother Don John of Austria, in which the Ottoman fleet was nearly annihilated. In 1578–'80, by the death of Dom Sebastian and of Henry the Cardinal, the throne of Portugal became vacant, and Philip, as uncle of Sebastian, claimed the crown, and sent Alva with an army to enforce his right. This was effected, and in 1581 Philip was recognized by the Portuguese estates as rightful sovereign of the kingdom. After the death of Orange he bent all his energies and resources to the conquest of England. The "invincible armada," which had been long in preparation, was sent for this purpose in 1588, but was completely foiled, partly by the elements, and partly by the English fleet. (See ARMADA.) The relations of Philip with France during his long reign had been sometimes warlike and sometimes peaceful, but both his arms and his money were freely given to aid the Catholics of that kingdom against the Huguenots. He continued his hostility against Henry IV. even after that monarch had become a Catholic, and his intrigues led Henry in 1595 to declare war against him. The contest was not favorable to Spain, and in 1598 Philip was reluctantly compelled to consent to the peace of Vervins. In the same year a complication of distressing maladies, the consequence of early debaucheries, caused his death, in the palace of the Escurial, which he had himself built, and which still remains the most magnificent monument of his power and wealth. One of the strangest transactions of Philip's reign was his treatment of his eldest son Don Carlos. (See CARLOS, DON, I.) Within three months after the death of Carlos his stepmother Queen Isabella died, it was reported at the time by poison administered by Philip's order. This accusation has been refuted by recent researches, and it is now known that she died in giving birth to a daughter who did not survive her, and was buried in the same coffin. The queen died in 1568, and in 1570 Philip married as his fourth wife the archduchess Anne of Austria, daughter of the German emperor Maximilian II., who became the mother of his successor Philip III.—See Prescott's "History of Philip II." (3 vols., 1856–'9; new ed., 1874), and Motley's "Rise of the Dutch Republic" (3 vols., 1856), and "History of the United Netherlands" (4 vols., 1860–'67).

PHILIP V., the first king of Spain of the house of Bourbon, born in Versailles, Dec. 19, 1683, died in Madrid, July 9, 1746. The second son of the dauphin Louis, son of Louis XIV., by Maria Anna of Bavaria, and a pupil of Fénelon, he was known as duke of Anjou until by the will of Charles II., who died childless, Nov. 1, 1700, he was called to the throne of Spain. (See CHARLES VI. of Germany.) Within a few weeks he was declared king at Fontainebleau by Louis XIV., and proclaimed at Madrid. His arrival in the peninsula was hailed with lively manifestations of popular satisfaction, while his power was acknowledged in Naples, Milan, the Netherlands, and the colonies. No opposition was offered to his accession by any European power except the house of Austria and the empire, who protested against the will of Charles II., and prepared for war. Philip nevertheless seemed to be firmly established, winning the favor of his subjects by attention to his duties, curtailment of useless offices, reform of abuses, and personal affability. But the rashness of Louis XIV., who, in contravention of express stipulations, endeavored to secure to his grandson the right of succession to the crown of France, alarmed Europe. A league between Austria, Holland, Great Britain, the empire, and Prussia was formed against France and Spain, to uphold the claims of the archduke Charles to the Spanish crown. The only allies of Philip V. at the opening of the contest, besides Louis XIV., were his uncle the elector of Bavaria, the duke of Savoy, whose daughter Louisa Maria Gabriella he had married, and the king of Portugal; but the last two were soon detached from his alliance by promises of territory, and finally joined the adverse coalition. The war opened in 1701 in Italy, where Prince Eugene at the head of Austrian troops gained the victories of Carpi and Chiari. Philip went to Italy and shared in Vendôme's and Eugene's drawn battle of Luzzara, Aug. 15, 1702, but was obliged to return in haste to Spain, which was attacked by the combined troops of Great Britain and Holland. The archduke landed in Portugal in 1704; and the king, marching against him, defeated the Portuguese on the frontiers, but was unable to retake Gibraltar, which had been captured by Admiral Rooke. During 1705 Valencia, Catalonia, and Aragon acknowledged Charles, whom Philip unsuccessfully besieged in Barcelona. The disorganization of his army obliged him to retreat to Perpignan, but he soon reëntered Spain, and through Navarre and Castile returned to Madrid, where his presence was sorely needed. Scarcely had he reached the capital, however, when the approach of Lord Galway and the marquis of Las Minas forced him to retreat to Burgos, accompanied by a small band of faithful adherents; while the archduke, under protection of the English and the Portuguese, was proclaimed king with the title of Charles III. Philip's affairs were now so desperate (Louis XIV.'s armies being about the same time beaten by Marlborough in the Low Countries and by Eugene in Italy), that he was advised to emigrate to his American dominions; but, encouraged by his wife and the princess Orsini (des Ursins), he refused to abandon the field, and rejected overtures of peace. Supported by Marshal Berwick, whose skill and valor retrieved his fortunes, he reëntered Madrid, and was reinstated on the throne by Berwick's brilliant victory at Almanza, April 25, 1707. The successful operations of the duke of Orleans in Valencia, Aragon, and Catalonia consolidated his power; but that commander, being charged by the princess Orsini with views of personal aggrandizement, was recalled to France; and Philip's success in Spain was checked, while abroad he lost Sardinia and Port Mahon in 1708. In the campaign of 1709 Tortosa, Denia, and Alicante were taken by his troops; but in the following year the two victories of Count Starhemberg enabled Charles III. to return to Madrid, whence Philip had again to fly. The timely arrival of Vendôme from France gave another favorable turn to affairs, and in company with that brilliant general Philip boldly advanced to the capital, expelled his competitor, and reëntered it, Dec. 3, 1710. The decisive battle of Villaviciosa, fought Dec. 10, was the signal of his definite triumph. Catalonia and Aragon were subsequently reconquered, and the archduke having in 1711 by the death of his brother become emperor, the greatest obstacle to peace was removed, the European powers being unwilling to restore the vast monarchy of Charles V., and Philip V. on his part assenting (Nov. 5, 1712) to a formal renunciation of his claims to the French succession. By the treaty of Utrecht (1713) he remained master of the kingdom of Spain, Spanish America, and other colonies; but he had to abandon Sicily to the duke of Savoy, and the Netherlands, Milan, Naples, and Sardinia to the house of Austria. Opposition at home was now quelled; and a treaty being signed with Portugal in 1715, Philip was permitted to reign in peace for several years. The government had been heretofore mostly in the hands of the *camarera mayor*, the princess Orsini, whom the queen had brought from France with her. This able woman had made and unmade ministers; she had assisted Orri in restoring the finances; she had even exercised her influence over the operations of war. The death of the queen (1714) seemed but to add to her power, and she completely won the confidence of the king. By the advice of Alberoni, she caused Philip to marry Elizabeth Farnese, whom she expected to govern as she had governed her predecessor; but on her arrival Elizabeth unceremoniously banished the *camarera mayor* from Spain. Through Elizabeth's influence Alberoni was appointed prime minister (1717-'18), and Spain seemed to be inspired with new life. Agriculture, commerce, and the arts revived; Sardinia and Sicily were reconquered, and Alberoni persuaded his master to undertake to restore the Stuarts in England by the assistance of Charles XII. of Sweden, to wrest the regency of France from the duke of Orleans, and to precipitate the Turks upon Austria. But, defeated in all these projects, Philip exiled the unsuccessful minister and joined the quadruple alliance, Feb. 17, 1720, giving up Sicily to Austria, while the duke of Savoy received Sardinia. He moreover, in 1721, abandoned Gibraltar and Port Mahon to the English, and by matrimonial alliances strengthened his union with France. His health had failed under his long trials; an invincible melancholy, aggravated by religious fears, preyed upon his mind; and, in spite of his wife's remonstrances, he abdicated, Jan. 10, 1724, in favor of his eldest son Louis, and retired to the monastery of San Ildefonso. But his son dying at the end of eight months, he yielded to the entreaties of the queen and resumed the exercise of power, Sept. 6, 1724. Another change of policy now took place, and by the instigation of Ripperda, a Dutch adventurer, who had won the queen's favor, Philip entered into an alliance with the emperor Charles VI., by the treaty of Vienna, April 30, 1725, whereby the two sovereigns guaranteed each other's possessions, and the Spanish king promised to uphold the emperor's pragmatic sanction. The alliance proved far from advantageous. Philip made an unsuccessful attempt in 1727 to retake Gibraltar, and then becoming disgusted with Ripperda, whom he had made his prime minister, banished him from Spain, listened to proposals from Cardinal Fleury, sent plenipotentiaries to the congress at Soissons (1728), and finally signed with France and Great Britain the treaty of Seville, by which he obtained for Don Carlos, his elder son by Elizabeth, the reversion of Tuscany, Parma, and Piacenza. He participated in the war for the succession in Poland, which broke out in 1733, and sent his son with the count of Montemar to Italy, where the latter, by his victory at Bitonto in 1734, conquered the kingdom of Naples, which was secured to the young prince by the treaty of Vienna (1738), while Tuscany was transferred to the duke of Lorraine, and Parma and Piacenza were assigned to the emperor. A dispute with England relating to American colonial affairs ended in hostilities, which were still going on when the war for the succession in Austria broke out. In this Philip V., or rather his queen Elizabeth and his second son Philip, actively engaged; and the latter was in a fair way to win a kingdom in northern Italy when the king died. Philip's reign was upon the whole favorable to Spain; some useful reforms took place, especially in the administration of justice; the finances were managed with considerable regularity; the navy was restored to a state of efficiency; industry and commerce were fostered; and a royal library and academies of languages, history, and the fine arts were established. Philip had by his first wife two sons: Louis, before mentioned, and Ferdinand VI., his successor; by his second wife, Don Carlos, whom he left king of Naples, Philip, who became duke of Parma in 1748, and several daughters, three of whom married respectively Joseph, king of Portugal, Louis, dauphin of France, and Victor Amadeus III. of Sardinia.

PHILIP, King, sachem of Pokanoket, youngest son of Massasoit, and the successor of his brother Alexander, killed at Mount Hope, R. I., Aug. 12, 1676. His Indian name was Pometacom, but his father was friendly to the English, and he received the name Philip. In 1662, immediately after he had been proclaimed sachem, he promised at Plymouth to continue the friendship heretofore existing with the English, to remain faithful to the king and colony, and not to dispose of any of his territory without giving them notice. In 1670–'71 rumors began to prevail that he was inclined to break the treaty. The tribe was frequently assembled, war preparations were constantly going on, and wanton murders were sometimes committed. In the spring and summer of 1671 a general attempt was made to disarm the Indians, and caused great dissatisfaction. For three years after this there was no open disturbance, and it has been a doubtful point whether the storm which broke out so suddenly in 1675 was simply accidental, or the result of a real and deliberate plot. Sassamon, a converted Indian who had informed the colony of the preparations going on, was killed. His murderers were tried, convicted, and executed, and in revenge the Indians murdered eight or nine white men. The war that ensued was of the most desolating character, the Indians never meeting the enemy in the open field, but rapidly passing from one exposed point to another, burning villages, cutting off by ambuscades detached parties of troops, and shooting down every one who ventured to stray outside of the places of protection. Philip also formed an alliance with the powerful tribe of Narragansetts, and in December, 1675, 1,000 men under the command of Josiah Winslow invaded their territory, stormed a fort in which there were said to have been 4,000 Indians, and utterly destroyed their village with all its stores. The war raged during the first half of 1676 with unabated fury, but the conquests of the Narragansetts and the complete destruction of his own tribe soon left Philip without resources. Deserted by all, he was hunted from spot to spot, and at last, taking refuge at Mount Hope, was there attacked by a party under Capt. Church, and in attempting to flee was killed by an Indian. His body was cut in quarters, and his head was sent to Plymouth, where it was exposed on a gibbet for 20 years. In this war 13 towns were completely destroyed and many others suffered severely; 600 buildings were burned, 600 of the colonists were slain, and the expenses were in the neighborhood of $1,000,000. The calamities of the war fell chiefly upon the Massachusetts and Plymouth colonies, Connecticut suffering comparatively little.—See Church's "History of King Philip's War" (1716; last ed., Boston, 1865).

PHILIP THE BOLD (*le Hardi*), duke of Burgundy, son of John the Good of France, born Jan. 15, 1342, died at the château of Hall, in Hainaut, April 27, 1404. The duchy having reverted to the crown of France on the death of the last member of the first ducal house in 1361, Philip, chosen by King John from among the princes on account of the courage which had gained him his surname at Poitiers, was invested with the title by letters of Sept. 6, 1363; but he did not actually assume the government and the title till 1364, his brother Charles V., who ascended the throne during that year, having confirmed the grant. On June 19, 1369, he married at Ghent Margaret of Flanders, widow of his predecessor and heiress of Flanders, Artois, Rethel, and Nevers, as well as of enormous wealth. He displayed much wisdom in administration, and although he took command of the king's army sent to oppose the English duke of Lancaster in Normandy, and fought against the English in 1372, 1374, and 1377, he kept aloof from the family and party conflicts of the time until the death of Charles (1380), when he became involved with his elder brother, the duke of Anjou, in the contest for the regency during the minority of Charles VI. Among the confused events of the times, whatever mastery remained to the divided and menaced government was finally left in the hands of Philip; but even after 1382, when the duke of Anjou went to Naples, his rule was interrupted by constant dissensions and insurrections. When in 1388 Charles declared his assumption of the throne, Philip was compelled to yield to his nephew the duke of Orleans; but on the king's becoming insane in 1392 he again placed himself at the head of affairs despite the opposition of Orleans, and held it without interruption till 1402. In 1396, finding his own possessions suffering from the war with England, he concluded an armistice with that kingdom. In 1402 the duke of Orleans seized the government during Philip's absence, but he was at once compelled to yield. For the remaining two years of Philip's life his regency continued without important interference.

PHILIP THE GOOD (*le Bon*), duke of Burgundy, grandson of Philip the Bold, and only son of John the Fearless, born in Dijon, June 13, 1396, died in Bruges, June 15, 1467. He was educated under the direction of his mother, apart from the dissensions which at that time disturbed France and absorbed the attention of his father, until in 1419 he was called by the assassination of the latter to succeed him in the government. With the help of Queen Isabella, who was inspired by hatred of her son the dauphin, he secured the regency of France which his father had held. This attained, he turned at once toward what formed the object of a great part of his life, revenge on the dauphin for the murder of his father. (See JOHN THE FEARLESS.) This he first sought by favoring the demands of England, going so far as to sign (May 21, 1420) the treaty of Troyes, which was little less than an agreement to cede France to the English king. After the death of Charles VI. he recognized Henry VI. of England as sovereign of France, and, assisted by the English, kept up the war waged against the dauphin (now Charles VII.), the rightful ruler. But seeing that if France and England really became united, he must give up further personal ambitions and resign himself to living in the position which his own dukedom would afford him as a subject prince, he changed his policy after years of persistence. On Aug. 6, 1435, he brought about negotiations at Arras for a treaty between the two countries, by which Charles VII. was only to lose a few provinces. The English refused these conditions; but on Sept. 21 Philip made a separate peace with the French king, by the terms of which he largely increased his possessions, already augmented by his marriage in 1424 with his cousin Jacobæa of Holland. From this time Philip devoted himself to the improvement of his own states, and made his court one of the leading ones of Europe. But he was frequently disturbed in his rule by the insurrections of Ghent and Bruges, and these several times attained formidable dimensions. His last great military measure was his endeavor to unite the princes of the German empire in a crusade against the Turks. The undertaking failed, chiefly through Philip's anxiety concerning the designs of his old enemy Charles VII., whose son, afterward Louis XI., had sought refuge in his territory. Philip's later years were disturbed by dissensions with his son and the French dauphin, whom he had protected. After the death of Jacobæa, who left him without issue, he was twice married, his last wife being Isabella of Portugal, the mother of his only son, Charles the Bold.

PHILIP THE MAGNANIMOUS, landgrave of Hesse, born in Marburg, Nov. 13, 1504, died in Cassel, March 31, 1567. In 1509 he succeeded his father William II., under the regency of his mother, and in 1523 married a daughter of George the Bearded, duke of Saxony. He was one of the earliest champions of the reformation, and in 1531, with John the Constant, the elector of Saxony, and other members of the empire, formed the Smalcald league, and subsequently shared its military leadership with the elector John Frederick. Maurice of Saxony, who married his daughter in 1541, and who nevertheless coöperated with the emperor Charles V. in the battle of Mühlberg (April 24, 1547), in which the league was overwhelmingly defeated, subsequently turned against the emperor and insisted upon the release of Philip, his father-in-law, who had been treacherously retained a captive, as a condition of the treaty of peace at Passau (Aug. 2, 1552); but Philip was compelled by the emperor to pay a large indemnity. He afterward resumed the government of his landgraviate, and bequeathed Cassel, Marburg, Rheinfels, and Darmstadt respectively to his four sons. During the lifetime of his wife, who was a Catholic, he had secretly married in 1540 a Protestant lady, Margaret von der Saale. The assent of Luther and Melanchthon to this act, on his plea that the former marriage was adulterous, occasioned great scandal. Among his biographers are Rommel (Giessen, 1830), Hofmeister (Cassel, 1846), and Rinck (Darmstadt, 1852).

PHILIPPEVILLE, a fortified town of Algeria, in the province of Constantine, on the gulf of Stora, 40 m. W. of Bona; pop. in 1872, 18,022, mostly of European descent. It is the seat of a civil tribunal and an Arabic bureau, and has a Catholic and a Protestant church, a mosque, a hospital, a museum, and barracks. A considerable transit trade from Europe to Constantine and the eastern Sahara passes through this city. It is connected by steamships with Marseilles and Algiers. The valleys around the town are very fertile; the hills are wooded, and cork trees abound. Philippeville was founded by the French in 1839, on the site and partly with the materials of the ancient Rusicada, and is called by the Arabs Ras Skiada.

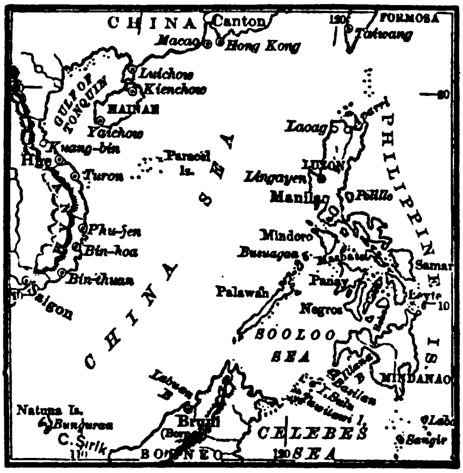
PHILIPPI, an ancient city of Macedonia Adjecta, near the shore of the Ægean sea, enlarged by Philip, father of Alexander the Great, from whom it received its name. Previously, as a town of Thrace, it had been called Crenides, the "place of fountains," from the numerous streams in the neighborhood. Near it were gold mines, which were not very productive until worked by Philip, who obtained from them 1,000 talents a year. It was taken by the Macedonian monarch about 357 B. C., and fortified as a protection against the Thracian mountaineers. At Philippi the fate of the Roman republic was decided in the contest between Brutus and Cassius on one side, and Antony and Octavius on the other, in the autumn of 42 B. C. There were two engagements on the same ground, 20 days apart, in the first of which Brutus gained the advantage over Octavius, and Antony over Cassius; in the second Brutus was totally routed. Philippi was afterward made a Roman colony by Augustus. It was twice visited by Paul (Acts xvi. and xx.), and was the first place in Europe where he preached the gospel; and to the church founded there he addressed one of his epistles. Subsequently Philippi became the ecclesiastical capital of Macedonia Prima, when the province was divided by Theodosius II. It is now a mass of ruins, of which the chief are the remains of an amphitheatre, the colossal relics of a temple of Claudius, and some enormous marble columns.

PHILIPPIANS, Epistle to the, a canonical book of the New Testament, written, according to the unanimous testimony of the ancient church, by the apostle Paul. It is expressly referred to by Polycarp, by the letter sent from the churches of Vienna and Lyons in A. D. 177, and by many of the earliest fathers. In modern times its authenticity has been questioned by Baur (*Paulus, der Apostel Jesu Christi*, 1845), against whom it has been in particular defended by Lünemann (1847) and Hilgenfeld, in the *Zeitschrift für wissenschaftliche Theologie* (1871). The epistle was probably written at Rome in A. D. 63, toward the close of the imprisonment mentioned in the last chapter of the Acts. The occasion for it seems to have been given by a pecuniary contribution which the congregation at Philippi sent him through Epaphroditus (iv. 10–18). Epaphroditus was taken sick in Rome (ii. 27), and after his recovery was sent back with this epistle to the Philippians. The epistle may be divided into three parts. In the first (ch. i. and ii.) the apostle refers at length to his sufferings in Rome; in the second (ch. iii.) he warns the Philippians against the doctrines of false Judaizing teachers; and in the third (ch. iv.) he addresses some exhortations to individual members, refers again to his personal circumstances, and concludes with salutations and benedictions. Throughout the epistle he exhorts the Philippians to humility and steadfastness in the faith.—Separate commentaries on this epistle have been written by Rheinwald (1827), Mathies (1835), Hölemann (1839), Hengel (1839), Rilliet (1841), Neander (1849; English translation by Mrs. H. C. Conant, New York, 1851), Ellicott (1861), Karl Braune in Lange's *Bibelwerk* (1867), and J. B. Lightfoot (1868).

PHILIPPINE ISLANDS, the most northern group of the Indian archipelago, belonging chiefly to Spain. They embrace an area of 112,500 sq. m., from lat. 5° 24′ to 19° 38′ N., and from lon. 117° 21′ to 126° 8′ E., and are bounded N. and E. by the Pacific, S. by the Celebes and Sooloo (or Mindoro) seas, and W. by the China sea. The group consists of 9 larger and nearly 1,200 small islands, most of the latter being little more than bare rocks, raised to the surface by volcanic action. The larger islands (exclusive of Palawan), with their area and population, as estimated by Dr. Meyer in 1871, are as follows:

ISLANDS.	Area in sq. m.	Population.
Luzon	41,121	4,540,191
Panay	4,742	1,052,586
Cebú	2,215	427,856
Leyte	3,592	285,495
Bohol	1,190	283,515
Negros	3,480	255,878
Sámar	5,028	250,062
Mindanao	33,877	191,802
Mindoro	3,940	70,926

The entire group is divided into 43 provinces, subdivided into 852 cantons, with a total population of 7,451,352. Luzon, the largest and best known island, is separated from the island of Sámar by the strait of San Bernardino. (See LUZON, and MANILA.) Mindanao, the most southern of the islands, has a coast line exceeding 1,000 m. Irregularly shaped, as are most formations of the group, it has a peninsula which stretches upward of 150 m. from the main part; its length from N. to S. is 275 m.; greatest breadth, exclusive of the peninsula, 140 m. In the interior is a large lake, about 30 m. long and 18 m. wide, of which little is known on account of the mountainous character of the country. The Spanish settlements are chiefly on the N. slopes. Mindoro is about 100 m. long, with an average breadth of 40 m. It has high but gently sloping mountains, the coasts being lined with low forest hills. The Malay settlements on the coast are few and insignificant. Panay is about 100 m. long, and its greatest breadth is 80 m.; its W. coast is well populated and cultivated; the interior is intersected by a steep mountain range. Negros is 130 m. long and 25 m. broad; it is mountainous, and has but few settlements. Cebú measures 140 m. from N. to S., but averages little more than 15 m. in width; it is well cultivated by a considerable number of settlers. Bohol, or Bojol, E. of Cebú and W. of Leyte, extends about 45 m. from W. to E., with an average width of 25 m. Leyte extends about 120 m. from N. to S., with an average breadth of 30 m. Sámar is 150 m. long, and its greatest breadth is 75 m. The greater part of this island is covered with high mountains. Masbate, the largest of a group called the Bisayan islands, measures about 85 by 15 m.; area, 1,225 sq. m. Palawan or Paragua, only the N. E. portion of which is included in the Spanish government of the Philippines, is 275 m. long with an average width of 20 m.—The geological features of the whole group are the same. Many mountainous parts abound in metals; gold is found in the sand of the rivers; iron, copper, coal, and sulphur may be obtained in most of the islands; mercury has been found in Luzon. The climate is hot, but tempered by great and fertilizing moisture. The rainy season lasts from May to November. The heaviest rains fall in July. The mean summer temperature is between 80° and 82°, the mean winter temperature between 70° and 72°. On the W. coasts very heavy rains fall during the S. W. monsoon, frequently flooding the soil and causing great damage; on the E. shores the mountain ranges keep the atmosphere clear and dry. The returning monsoon, on the other hand, which begins in October, moistens and fertilizes the E. slopes. A great part of



Luzon is subject to typhoons, which blow between May and December and last from six to eight hours, often causing great destruction to the shipping and property on shore.—The agricultural products of the Philippines include sugar, indigo, tobacco, rice, millet, maize, sago, hemp, and coffee. Tobacco thrives, and forms a staple export in the shape of Manila cigars. Rice is widely cultivated, and forms the principal article of food of the bulk of the population. Fruits and vegetables introduced from more temperate regions grow well. The trees with which many of the mountains are covered furnish various kinds of valuable timber, as well as dye woods and gums. Among the animals are strong buffaloes, which are caught and trained when young, and used as beasts of burden and for all purposes of tillage and husbandry; small but hardy horses, introduced by the Spaniards; goats, pigs, sheep, and large numbers of water fowl as well as domestic poultry. There are no wild beasts, but crocodiles and snakes infest the lakes and marshes. Swallows build edible nests in the chalk cliffs; parrots and pigeons are met with in all the islands. The sea and rivers abound with fish, which the Malays prefer to meat.—The population is extremely mixed. The pure Spaniards do not exceed 5,000 in all, but there are many creole Spaniards, metis, Chinese, Chinese half-breeds, and Mohammedans from the East Indies. The Malay Indians form the bulk of the population, and are divided into two tribes, the Tagals and the Bisayans. They make matting, straw hats, cigar cases, baskets, cloth and tissues of every sort, cordage, and leather, and are clever workers in gold, silver, and copper; the women are especially expert in needlework. Their agricultural implements are very simple, and their plough is remarkable for its lightness and efficiency. The race called negritos by the Spaniards were probably the aboriginal inhabitants of the Philippines, and are still found in considerable numbers on the mountains. They appear to be gradually dying out, and when the Spaniards first landed had already been driven back by the Malays to the mountainous parts. (See NEGRITOS.) The Spanish laws for the Indians are extremely simple. Every township annually elects a deputy governor, who acts as mayor, justice, and magistrate. In important affairs he is dependent upon the governor of the province, the latter being subordinate to the captain general, whose seat of government is at Manila; the other important islands are presided over by lieutenant governors. Every male inhabitant must, besides paying a small personal tax, give 40 days' labor annually to the public works department; besides which, in some parts of Luzon, the *polistas* or coolies (numbering 957,427 in 1871) must cultivate tobacco for the government, but from this service they may purchase exemption.—The Philippines were discovered by Fernando Magalhaens in 1521; but the Arabs had already established communication with these islands by sailing along the shores of India, and thence crossing the bay of Bengal. Magalhaens was killed on one of the islands. In 1564 Philip II. sent a squadron under Lopez de Leguaspi from Mexico, which first landed at Cebú, and soon subdued it. In 1570 a second fleet sailed from Panay for Luzon, and finally, after repeated engagements with the native chiefs, effected a settlement on the bay of Manila. In the following year the Spanish admiral proclaimed Manila the capital of these possessions for his royal master, after whom they were thenceforward called. With the exception of fruitless attempts on the part of the Dutch and the Chinese during the 16th century to obtain a footing on the islands, which had meanwhile opened a valuable trade with Japan, the Spaniards remained in undisturbed possession till 1762, when the English stormed Manila under Admiral Cornish and Sir William Draper. The city saved itself from plunder by agreeing to pay a ransom of $5,000,000. The smaller islands long suffered severely from the attacks of pirates, who had always infested those seas. In 1851, however, their depredations were checked by a successful naval expedition against the island of Sooloo, the sultan of which was deposed, and a permanent Spanish settlement was established there. The Philippine islands were explored in 1863 by Mr. Semper, and more recently by the German naturalist Dr. Meyer. Many restrictions still hamper commerce, and only four ports are open to foreign shipping: Manila and Saal in Luzon, Zamboanga in Mindanao, and Iloilo in Panay.

PHILIPPOPOLI (Turk. *Filibeh*), a town of European Turkey, in the vilayet of Edirneh (Adrianople), about 230 m. W. N. W. of Constantinople, with which and Adrianople it is connected by rail; pop. about 45,000, consisting of Turks, Bulgarians, Greeks, Armenians, Jews, and gypsies. It is situated in the midst of a broad fertile plain on the Maritza (Hebrus), is well built, with paved streets and good bazaars, and has an important commerce. Its suburbs contain numerous villas, vineyards, and orchards, and the best rice in Turkey is raised in the vicinity. The town is the seat of a Greek archbishop, has a number of churches and mosques, a synagogue, and several schools. The manufactures include silk, cotton, leather, tobacco, and soap. The place was founded by Philip of Macedon, taking the name of Philippopolis, and under the Romans, by whom it was sometimes called Trimontium, from its situation on a hill with three summits, it was an important town and the capital of the province of Thrace in its narrower sense. In 1818 the town was almost entirely ruined by an earthquake, but soon recovered and became very flourishing.

PHILIPPOTEAUX, Félix Emmanuel Henri, a French painter, born in Paris, April 3, 1815. He studied under Léon Cogniet, and in 1833 exhibited his first picture, representing an episode of the American war of independence, entitled "The Rock of Ice." Among his subsequent works are "The Retreat from Moscow," "The Capture of Ypres," "The Death of Turenne," "Bayard at the Bridge of the Garigliano," "Louis XV. visiting the Battle Field of Fontenoy" (one of his best), "General Gourgaud saving Napoleon's Life," "The last Banquet of the Girondists," many relating to Algerian warfare and life, and various genre pictures. In 1863 he produced pictures of the battles of "Montebello" and "Diernstein," in 1864 "The Bride of the Kettledrummer," in 1865 "The Siege of Puebla," and in 1873 episodes of the Franco-German war.

PHILIPPSBURG, a town of Baden, at the confluence of the Salzbach with the Rhine, 15 m. N. of Carlsruhe; pop. about 2,300. It belonged till 1803 to the bishops of Spire, and was an important fortress of the empire, its position always inviting the first attacks of the French. It was fortified at the commencement of the thirty years' war, and in the course of it was taken successively by the Swedes, French, and Germans, and again by the French, to whom the peace of Westphalia secured the right of garrison. It was taken by the duke of Lorraine in 1676, and confirmed to Germany by the treaty of Nimeguen. It fell into the hands of Louis XIV. in 1688, and was restored to the empire by the treaty of Ryswick in 1697. In 1734 the French again captured it, but relinquished it in 1735. They forced it to surrender in 1800, and levelled its fortifications.

PHILIPPSON, Ludwig, a Jewish author, born in Dessau, Germany, Dec. 27, 1811. He was a preacher and director of a school at Magdeburg from 1833 to 1840, when he became a rabbi. He founded in 1837 *Die allgemeine Zeitung des Judenthums*, which he still edits, though blind, and published a translation of the Old Testament, with the text and notes (2d ed., Leipsic, 1859-'62). Among his early works are *Benedict Spinoza als Mensch* and *Wie verloren die Juden das Bürgerrecht im Ost- und Weströmischen Reiche?* and among his latest are *Sepphoris und Rom* (2 vols., Berlin, 1866), *Die weltbewegenden Fragen in Politik und Religion* (2 vols., Leipsic, 1868-'9), and *Die Hochschule für die Wissenschaft des Judenthums* (Berlin, 1872).

PHILIPS, Ambrose, an English poet, born about 1671, died in London, June 8, 1749. He graduated at Cambridge in 1696, and was one of the authors of the collection of verses published by the university on the death of Queen Mary. He also translated Sappho's "Hymn to Venus." Among his earliest poetical publications are six "Pastorals," printed in Tonson's "Poetical Miscellany" in 1709, the pastorals of Pope appearing in the same volume. The rivalry thus provoked led to a violent warfare between the two authors. In 1712 Philips produced "The Distressed Mother," a tragedy founded on Racine's *Andromaque*. It was played with great success, and received high praise from the "Spectator." In 1721 he brought out two other tragedies, "The Briton" and "Humphrey, Duke of Gloucester." In 1718, in connection with Dr. Boulter, he commenced "The Freethinker," a serial paper, which enjoyed great popularity. When Boulter was made primate of Ireland, Philips became his secretary, and was elected to the Irish parliament. In December, 1726, he was made secretary to the Irish chancellor, and in August, 1734, registrar of the prerogative court. Some years after the death of his patron he returned to London (1748), and published a collection of his poems.

PHILIPS, or Phillips, John, an English poet, born at Bampton, Oxfordshire, Dec. 30, 1676, died Feb. 15, 1708. He was educated at Winchester and at Christ Church, Oxford. In 1703 he published a mock-heroic poem entitled "The Splendid Shilling," imitating the manner of "Paradise Lost." In 1705 he composed a gratulatory poem on the battle of Blenheim. His principal work, "Cyder," in two books (1706), is an imitation of Virgil's Georgics.

PHILISTINES (Heb. *Pelishtim*), a people which gave to the Holy Land the name of Palestine (from *Pelesheth*, the name of their own limited territory), though possessing only the portion on the S. coast bounded by the hilly regions of Dan, Ephraim, and Judah, and extending S. W. to the confines of Egypt. Their origin is uncertain, but it is probable that portions of them came from lower Egypt (the "Philistines from Caphtor" of Amos and Caphtorim of Deuteronomy, according to Ebers and others). They were early settled in Palestine, having expelled the Avim, who occupied the same region before them. They are mentioned in the history of Abraham, and from fear of war with them Moses did not lead the Israelites through their country, which was the most direct route. From the time the Israelites passed over into the Holy Land, they were engaged in a perpetual conflict with this warlike people, especially during the time of the later judges, Samson, Eli, and Samuel. Saul, the first Hebrew king, fell in battle against them at Gilboa. David, who had slain their giant warrior Goliath, defeated them in several battles, and to some of his successors they paid tribute; but generally they were independent and carried on war against the Hebrew monarchs. In the time of the Maccabees Philistia was subject to Syria, and subsequently it came under the power of the Romans. The leading Philistine cities, in early times ruled by separate but confederated princes (Heb. *seranim*), were Gaza, Ashdod or Azotus, Ascalon, Gath, and Ekron, which became rich and powerful in consequence of a large transit and maritime trade, stimulated by superior agricultural resources. The religion of the Philistines resembled that of the Phœnicians, their principal deities being the goddess Derceto, who was worshipped at Ascalon, and Dagon, whose chief temples were at Gaza and Ashdod. Derceto was probably identical with Asherah, whose image was a wooden statue or column, improperly rendered grove in the English Bible. Ekron was the principal seat of the worship of Baal-zebub, and to the oracle there Ahaziah, king of Israel, sent when he became sick. They had numerous priests and soothsayers, and in war carried about with them the images of their gods.

PHILLIMORE. I. John George, an English jurist, born at Shiplake house, Oxfordshire, in 1809, died there, April 27, 1865. He was for some time a professor in the Middle Temple, London, and in 1852 he was elected to parliament. His principal works are: "Introduction to the Study of Roman Law" (London, 1848); "History of the Law of Evidence" (1850); "Principles and Maxims of Jurisprudence" (1856); "Private Law among the Romans from the Pandects" (1863); and "History of England during the Reign of George III." (1863). **II.** Sir **Robert Joseph**, an English jurist, brother of the preceding, born in London, Nov. 5, 1810. He graduated at Oxford in 1831, and in 1862 became advocate general in admiralty, in 1867 judge of the high court of admiralty, and in 1871 judge advocate general. He was in parliament from 1853 to 1857. He has published "Study of the Civil and Canon Law" (1843); an edition of Lord George Lyttelton's "Memoirs and Correspondence" (1845); "Law of Domicile" (1847); "Commentaries on International Law" (4 vols., 1854–'61); and "The Ecclesiastical Law of the Church of England" (2 vols., 1873).

PHILLIP, John, a Scottish painter, born in Aberdeen in May, 1817, died in London, Feb. 27, 1867. He studied at the royal academy in London, was a portrait painter in Edinburgh, removed to London in 1841, and in 1857 became a member of the royal academy. His works include "The Presbyterian Catechising," "A Scotch Fair," "Baptism in Scotland," "Scotch Washing," "The Spaewife of the Clachan," "A Visit to the Gypsy Camp," "The Spanish Letter Writer," "The Marriage of the Princess Royal," and "The House of Commons." He lived in Spain from 1852 to 1856.

PHILLIPS. I. An E. county of Arkansas, separated from Mississippi by the Mississippi river, and intersected in the N. E. by the St. Francis and L'Anguille rivers; area, 725 sq. m.; pop. in 1870, 15,372, of whom 10,501 were colored. It has a level surface, swampy in parts, and a fertile soil. The chief productions in 1870 were 3,180 bushels of wheat, 293,849 of Indian corn, and 18,002 bales of cotton. There were 1,267 horses, 1,605 mules and asses, 1,178 milch cows, 2,387 other cattle, and 8,830 swine. It is traversed by the Arkansas Central railroad. Capital, Helena. **II.** A N. county of Kansas, bordering on Nebraska, and intersected by the N. fork of Solomon river; area, 900 sq. m. It is not included in the census of 1870. It has a rolling surface, consisting chiefly of fertile prairies. Capital, Phillipsburgh.

PHILLIPS, Adelaide, an American singer, born in Bristol, Eng., in 1838. She came to America when seven years of age, and has since lived in Boston and its vicinity. Her first professional engagement was at the Boston museum, where she remained for eight years. While a member of the dramatic company of this theatre her voice, a contralto, began to develop under the instruction of Madame Arnault, and in 1852 she was enabled to go to Europe by a subscription headed by Jenny Lind. She studied for a year in London under Garcia, then went to Italy, and in November, 1853, made her début at Brescia. In December, 1855, she sang at the Carcano in Milan in the "Barber of Seville." She appeared at the Boston music hall in concert in October, 1855, and at the New York academy of music in opera in March, 1856. In October, 1861, she was heard at the Italian opera in Paris, and subsequently in Madrid, Liége, Antwerp, and other continental cities. In 1869 she took part in the great Boston peace jubilee.

PHILLIPS, Charles, an Irish barrister, born in Sligo in 1787, died in London, Feb. 1, 1859. He was educated at Trinity college, Dublin, was called to the Irish bar in 1811, and to the English bar in 1821, at which time he had acquired a considerable reputation as an effective though florid speaker. For some years he was regarded as the leading counsel at the Old Bailey. In 1842 he was appointed by Lord Lyndhurst commissioner of bankruptcy in Liverpool, and in 1846 commissioner of the court of insolvent debtors, which office he filled till his death. As an author he is best known by his "Recollections of Curran and some of his Contemporaries" (2 vols. 8vo, 1818), of which several editions have been published, and by a volume of speeches (1817), one of which, in the crim. con. case of Guthrie *v.* Sterne, had several editions. He also published "An Historical Sketch of Arthur, Duke of Wellington" (1852), "Napoleon III." (1854), and "Vacation Thoughts upon Capital Punishments" (1856).

PHILLIPS, Georg, a German historian, born in Königsberg, Jan. 6, 1804, died near Salzburg, Sept. 6, 1872. His parents were Protestants of English descent. He was educated at Munich and Berlin, and became a member and an ardent defender of the Roman Catholic church. In 1833 he was appointed professor of civil law at Munich, in 1849 of canon law and legal history at Innspruck, and in 1851 of legal history at Vienna. In 1838 he founded with Görres the *Historisch-politische Blätter*, an ultramontane organ. He published *Grundsätze des gemeinen deutschen Privatrechts* (3d ed., 2 vols., Berlin, 1846); *Englische Reichs- und Rechtsgeschichte* (2 vols., 1827–'8); *Deutsche Geschichte* (2 vols., 1832–'4); *Das Kirchenrecht* (7 vols., Ratisbon, 1845–'69); *Deutsche Reichs- und Rechtsgeschichte* (2 vols., Munich, 1845–'50; 5th ed., 1875); *Lehrbuch des Kirchenrechts* (2 vols., 1861–'2; 2d ed., 1871); and *Vermischte Schriften* (3 vols., Vienna, 1856–'60).

PHILLIPS. I. John, an American merchant, born in Andover, Mass., Dec. 6, 1719, died in Exeter, N. H., April 21, 1795. He graduated at Harvard college, studied theology, preached for a time, and afterward engaged in mercantile pursuits. He endowed a professorship in Dartmouth college, contributed to Princeton college, and gave to Phillips academy at Andover $31,000, besides a third interest in his estate. He founded Phillips academy at Exeter in 1781, and endowed it with $134,000. **II. Samuel,** jr., nephew of the preceding, born in North Andover, Mass., Feb. 7, 1751, died in Andover, Feb. 10, 1802. He graduated at Harvard college in 1771, was a member of the provincial congress, and of the constitutional convention of 1779, and state senator for 20 years, being for 15 years president of the senate. He was judge of the court of common pleas, commissioner of the state in Shays's insurrection, and lieutenant governor at the time of his death. He planned and organized Phillips academy at Andover, and secured endowments for it from his father, Samuel Phillips, a member of the governor's council, and from his uncles and cousin, and left $5,000 to the town for educational purposes. He was one of the founders of the American academy of arts and sciences of Boston.

PHILLIPS, John, an English geologist, born at Marden, Wiltshire, Dec. 25, 1800, died in Oxford, April 24, 1874. He was the assistant of his uncle William Smith, the "father of English geology," delivered courses of lectures in various places, was professor of geology in King's college, London, and in the university of Dublin, and in 1856 succeeded Dr. Buckland as reader in geology in the university of Oxford. After 1832 he arranged and edited the reports of the British association. He invented a self-discharging electrophorus and a peculiar maximum thermometer, was engaged with Major (now Gen.) Sabine in the magnetic survey of the British islands, and made special researches on the physical aspect of the sun, moon, and Mars. His most important works are: "Illustrations of the Geology of Yorkshire" (2 parts 4to, London, 1829–'36); a "Treatise on Geology" (2 vols. 12mo, 1837–'8; 2d ed., in Lardner's "Cabinet Cyclopædia," 1852); "Palæozoic Fossils of Cornwall, Devon," &c. (8vo, 1841); and "Notices of Rocks and Fossils in the University Museum, Oxford" (8vo, 1863). To meteorology he contributed "Three Years' Observations on Rain."

PHILLIPS, Watts, an English dramatist, born about 1828, died in December, 1874. He studied drawing under George Cruikshank and in Paris, where he long resided. He excelled as an artist, but was chiefly known by his plays. His "Joseph Chavigny" was produced in 1856. His most popular subsequent play was "The Dead Heart." His other works include "Camilla's Husband," "The poor Strollers," "The Huguenot Captain," "Maud's Peril," "Lost in London," and "Amos Clarke."

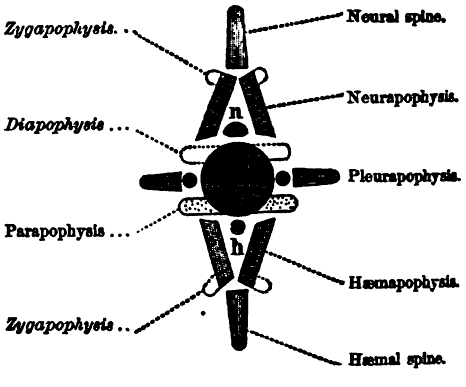
PHILLIPS, Wendell, an American orator, born in Boston, Mass., Nov. 29, 1811. His father was John Phillips, the first mayor of Boston. Wendell graduated at Harvard college in 1831, at the law school in 1833, and was admitted to the bar in 1834. In 1836 he became a Garrison abolitionist (see Garrison, William Lloyd), and in 1839 relinquished law practice from unwillingness to observe the oath of fealty to the federal constitution. His first notable speech was made in Faneuil Hall in December, 1837, in a meeting called to consider the murder of the Rev. Elijah P. Lovejoy at Alton, Ill. From that time till 1861 he was a prominent leader and the most popular orator of the abolitionists. He advocated disunion as the only road to abolition until the opening of the civil war, after which he sustained the government for a similar reason. In 1863–'4 he advocated arming, educating, and enfranchising the freedmen, and for the two latter purposes procured the continuance of the anti-slavery society till after the adoption of the 15th amendment in 1869. In 1870 he was the temperance and labor reform candidate for governor of Massachusetts, receiving nearly 20,000 votes. At a meeting in Faneuil Hall in January, 1875, called to denounce the Louisiana policy of President Grant, Mr. Phillips made a powerful speech in favor of that policy. He has long advocated woman suffrage, prohibitory liquor laws, and prison reform, and opposed capital punishment. His financial views were set forth in a speech delivered in Boston in March, 1875. He has delivered numerous popular lectures in most of the northern states, the more notable being those on "The Lost Arts" and "Toussaint l'Ouverture," and funeral eulogies on Theodore Parker and John Brown. There is no complete edition of his speeches; several of them have been published as pamphlets and widely circulated both in the United States and in England. A partial collection has been published in Boston (8vo, 1864, and 12mo, 1869). His other writings are scattered through numerous periodicals and newspapers.

PHILO JUDÆUS, a Jewish philosopher of Alexandria, born probably in Egypt a few years before Christ. He was of the priestly family of Aaron, and was sent at the head of an embassy to Caligula, after the massacre of the Jews in Egypt, to defend that people against the calumnies of Apion. He lived and taught at Alexandria, enjoying great personal popularity, and exercising by his writings a wide influence upon the opinions of his Jewish brethren. His son married a daughter of King Agrippa. Philo belonged probably to the sect of the Pharisees, but departed widely from their methods of interpreting the Scriptures, the narratives of which he allegorized in a peculiar way. He was a Platonist, and endeavored to reconcile the philosophy of the Grecian sage with the records of the Hebrew lawgiver. His purpose was to show that the Mosaic revelation contained in germ all that was afterward developed into the various forms of Greek philosophy. In his characteristic doctrine of the Logos and of the ideal and archetypal world, he anticipated the speculations of the Gnostics. The best edition of his works is that of Thomas Mangey (2 vols., London, 1742), but additional treatises were discovered by Cardinal Mai (1818), and others exist in Armenian versions (Venice, 1822). There is an English translation of Philo by Mr. C. D. Yonge in Bohn's "Ecclesiastical Library" (4 vols. 12mo).—See Gfrörer, *Philo und die alexandrinische Theosophie* (1835), and Bruno Bauer, *Philo, Strauss und Renan und das Urchristenthum* (1874).

PHILOLOGY. See LANGUAGE.

PHILOPŒMEN, a Greek general, born about 252 B. C., died by poison in Messene in 183. His father, Craugis, belonged to a noble family of Arcadia, and was one of the most prominent men of Megalopolis; but dying early, he left his son to be brought up by his friend Cleander. He first appears prominently in 222, when, Cleomenes III. of Sparta having seized upon Megalopolis by night, Philopœmen with a few others made a most determined resistance. In 221, Antigonus Doson coming into the Peloponnesus to the assistance of the Achæan league, Philopœmen joined his army with 1,000 foot and a detachment of cavalry, and contributed to the victory of Sellasia, where he refused to leave the field, though severely wounded. He afterward went to Crete and assisted the city of Lyctus in its war against Cnossus. Aratus, the leader of the Achæan league, died in 213, and Philopœmen in 210 was made commander of the cavalry. In 209 he accompanied Philip, the successor of Antigonus Doson, in the expedition against Elis, and in a battle near the river Larissus defeated the Ætolians and Eleans, and slew their leader, Demophantus, with his own hand. In 208 Philopœmen became strategus of the Achæan confederation. A war broke out between the Achæans and Machanidas, tyrant of Sparta, and in a battle fought at Mantinea he totally routed the enemy, himself killing the Spartan king. In 202 Nabis, who had succeeded Machanidas, seized upon Messene, and Philopœmen collected a body of armed men and drove the tyrant back into Laconia, and the following year again defeated him at Scotitas. He subsequently again took part in Cretan conflicts. In 194 Nabis invaded Achaia, and besieged Gythium. To relieve this town Philopœmen fitted out a fleet, which failed to accomplish its purpose; but marching against Sparta, although he fell into an ambush, he defeated the enemy with terrible slaughter. Shortly after his return Nabis was murdered by his Ætolian auxiliaries, whereupon Philopœmen hastened to Sparta and induced that city to join the Achæan league. In 189 the party hostile to him gained the supreme power there, and the connection with the league was dissolved, 80 of Philopœmen's friends being put to death. He now marched into Laconia. Sparta submitted, and was treated with great rigor. His severe measures offered an opportunity to the Romans of again interfering, who compelled the granting of a general amnesty and the restoration of political exiles. In 183 Philopœmen was elected strategus for the eighth and last time. Messene having dissolved its connection with the league, Philopœmen collected a detachment of cavalry and hastened forward to reduce it, but was repulsed and thrown from his horse, fell into the hands of the enemy, and was thrown into a dungeon by Dinocrates, the Messenian leader, who at night sent an executioner to him with a cup of poison. On receiving the news of his death Lycortas at the head of an army immediately entered Messenia and ravaged the country far and wide. Dinocrates slew himself, and his accomplices in poisoning Philopœmen were stoned to death. The body of Philopœmen was burned, and the ashes were put in an urn and carried to Megalopolis by the historian Polybius, in a solemn procession of the army; and statues to his memory were erected in almost all the cities of the league.

PHILOSOPHICAL ANATOMY, a department of anatomical science, based on data furnished by descriptive and comparative anatomy, embryology, and histology. It is also called transcendental anatomy, as it seeks a fundamental unity in all the forms of nature, and, in the usual restricted signification of the term, aims to establish a primary plan or archetype of which all skeletons, at least of the vertebrata, are modifications. As early as 1807 Oken made three cranial vertebræ, which he calls those of the ear, jaw, and eye, proceeding from behind forward; the auditory nerves traverse the first, the trifacial the second, and the optic the anterior or third; the petrous bone he considers a sense capsule of the ear; he recognizes the vomer as a fourth rudimentary vertebral body, with the lachrymal bones as laminæ or *neurapophyses*, and the nasals as spinous processes or neural spines; the palate bones he regards as the ribs of the head anchylosed; the squamous portion of the temporal bone of mammals and the tympanic of birds represent the scapula and ilium of the head; he recognized the arm, forearm, and hand in different parts of the upper jaw, and the corresponding bones of the posterior limbs in the lower jaw; the clavicles of the head were the pterygoid bones. In fact, the head was to him a repetition of the whole trunk with all its systems; he even states as a fundamental principle that the whole osseous system is only a repetition of a vertebra. After various modifications suggested by other observers or the results of his own researches, in 1843, in his "Physiophilosophy" (Ray society translation, London, 1847), he pursues his cranial homologies still further, always regarding the head as a repetition of the trunk, a doctrine strenuously combated by Owen and others. His theory is detailed at length in the work just quoted, pp. 318–422. His cranial vertebræ are: 1. The occipital, consisting of the body, two condyles, and crest of this bone; this is also the auditory vertebra, as it encloses the auditory bones, and that part of the encephalon which gives off the nerves of hearing. 2. The parietal, consisting of the body of the posterior sphenoid, the greater wings, and the parietal bones; this is also the lingual vertebra, the maxillary and lingual nerves passing through the wings. 3. The frontal, composed of the body of the anterior sphenoid, orbital or lesser wings, and two frontals; this is also the optic vertebra, the optic nerves passing through the orbital plates; it also surrounds the cerebrum. 4. The nasal, consisting of vomer, ethmoid, and two nasal bones, containing the olfactory nerves. The skull contains, therefore, a vertebra to each sense; the sense of touch is disseminated over the whole body, and its vertebræ are 35, 15 in the neck and chest, 5 in the abdomen, and 15 in the lumbar, sacral, and caudal regions. This system is normal only in the human type, animals being irregular men. He says the pectoral and abdominal muscles are ennobled in the muscles of the face; the mouth is the stomach in the head, the nose the lung, the tongue the end of the intestine converted into muscle, and the salivary glands the liver.—The poet Goethe first suggested to anatomists the idea of representing the mutual relations of the bones by figurative diagrams; he had conceived the idea of the cranial vertebræ as early as 1790, but did not make it public until after Oken's inaugural dissertation in 1807. In his essays on comparative anatomy (1819–'20) he made six vertebræ in the mammalian head, three on the posterior part enclosing the "cerebral treasure" and its delicate subdivisions, and three anterior communicating with the external world; these vertebræ are the occipital, posterior and anterior sphenoid, palatal, upper jaw, and intermaxillary. Duméril (*Magasin encyclopédique*, 1808) showed the analogy of the cranial segments and their muscles to the spinal vertebræ and muscles; he regarded the basi-occipital bone as a vertebral body, the condyles as oblique processes, the occipital protuberance as a spinous process, and the mastoid as a transverse process. He considered the body of the sphenoid as perhaps a second vertebral centre, but rather inclined to the opinion that the head consisted of a single huge vertebra, with similar form, use, and muscular attachments as a spinal vertebra. Spix (*Cephalogenesis*, 1815) adopted the number and composition of the cranial vertebræ of Oken's system, only giving them new names. De Blainville (1816) taught in his lectures that the head consists of a series of consolidated vertebræ, developed in proportion to the nervous system contained within them, with simple appendages (ribs), or compound (jaws, limbs, &c.); this is further developed in his *Ostéographie* (1839) and *Histoire des sciences de l'organisation* (1845). Bojanus (*Isis*, 1818) made four cranial vertebræ, the fourth being the nasal, whose neural arch he determined, and the ribs of the tympanic; he named the vertebræ acoustic, gustatory, optic, and olfactory.—Geoffroy Saint-Hilaire (*Annales du muséum d'histoire naturelle*, 1807, vols. ix. and x.) recognized the homology of the pectoral fins of fishes with the anterior extremities of birds, of the bony apparatus of a sternum and its annexes with these parts in higher vertebrates; he attempted the determination of the cranial bones in the crocodile, dividing them into those of the mouth, nose, eye, ear, and brain, regarding the skull as a kind of house with chambers for the lodgment and protection of the brain and organs of sense, but he did not at that time appear to have had the idea of cranial vertebræ; he showed that the cranium of birds was composed of the same bony pieces as that of man and mammals, recognizing a unity of plan of organic composition in all the vertebrata. His *Philosophie anatomique* (2 vols. 8vo, Paris, 1818–'22) developed his ideas on the homologies of the vertebrate skeleton; in the *Mémoires du muséum d'histoire naturelle* (vol. ix., 1822, pp. 76–119) he gives his ideas on the structure and typical form of the vertebra, and a representation in fig. 5. In the *Annales des sciences naturelles* (vol. iii., 1824) he explains in a synoptic table (plate 9) the composition of the bony head of man and vertebrates; he makes seven vertebræ, as follows, from before backward: the labial, nasal, ocular, cerebral, quadrigeminal, auricular, and cerebellar. He studied the homologies of the hæmal arches more carefully than his predecessors; he made nine pieces in each vertebra, combining, however, some of the parts of the external or dermal skeleton to which the vertebral theory does not apply; he regarded the branchial arches of fishes as the homologues of the tracheal rings of terrestrial vertebrates. With all his errors, Geoffroy Saint-Hilaire gave a great impetus to the study of philosophical anatomy in France. His most powerful and constant antagonist was Cuvier, who treated with ridicule and contempt this form of German philosophy; these two anatomists carried on their discussions, both by lectures and writings, with all the eagerness and often the bitterness of a partisan spirit; ability and brilliancy were on the side of Cuvier, but truth and the more philosophical treatment of the subject were with Geoffroy Saint-Hilaire.—Carus of Dresden (1828) was the most successful cultivator of philosophical anatomy after Oken; in his *Grundzüge der vergleichenden Anatomie und Physiologie* (translated into French by Jourdan, Brussels, 1838) he gives fair credit, though with slight mention, to French anatomists, and lays great stress upon the researches of Germans in this direction; he says incidentally that philosophic osteology owes nothing to the English and Italians, an assertion since contradicted by the appearance of the works of Richard Owen, who, if any one, may be said to represent the present opinion of the scientific world in matters of philosophical anatomy. Carus maintains that the same relation exists between the three cranial vertebræ and the three cerebral masses pertaining to the three great sensorial nerves (of hearing, vision, and smell), as between each spinal vertebra and the ganglionic swelling of the cord which it envelops. He gave the name of dermatoskeleton to that which in solidifying separates an animal from the external elementary substance, air or water; this external elementary substance also penetrates within the animal, requiring a more or less solid limitation internally, in the alimentary and respiratory systems, constituting the splanchnoskeleton; the neuroskeleton is that which limits and protects the nervous system, being peculiar to the vertebrates, the most perfectly developed, and in proportion to the nervous system. The dermatoskeleton is the first and lowest in the animal kingdom; it appears as horny envelope, shell, scales, osseous plates, and skin; it is increased from without, permanent or deciduous, and reproduced by the coagulation or calcification of the integument. The splanchnoskeleton is also inferior in rank, cartilaginous, but capable of undergoing bony transformation in the higher animals; tracheal rings, branchial arches, and teeth belong to this skeleton; the neuroskeleton is formed as indicated in the article Bone. He divides the cerebral mass into three portions, cerebellum, cerebrum, and optic lobes between them, with three pairs of ganglia in front; the spinal ganglia, in man, are 30. He constructs the skeleton on geometrical principles, starting from the hollow sphere, double cone, and cylinder; he makes what he calls proto-, deuto-, and trito-vertebræ; the first (ribs) enveloping the body and its viscera in relation with vegetative life; the second (vertebræ) protecting the nervous system; and the third (limbs) becoming the osseous framework which sustains the muscular and locomotive organs. His three principal cranial vertebræ correspond to the three cerebral masses, and are the occipital, centricipital, and sincipital; the three facial vertebræ form the nose and its cartilages, and the three intervertebræ he names auditive, optic, and olfactory. But it has been found impossible to explain the vertebrate homologies by his diagram archetype; for this the reader is referred to the work above cited. In fishes we find the first development of the neuroskeleton, as distinguished from the splanchnic and external skeletons, but at its lowest stage, being cartilaginous or partially osseous; it is of inferior vitality, and the component parts are imperfect in form and number; in this class the sexual organs predominate. In reptiles the neuroskeleton is for the first time bony; the splanchnic skeleton is truly cartilaginous, and the external truly corneous; the abdominal region or the digestive system predominates. In birds the thoracic region or respiratory system predominates, extending even into the cavities of the bones and feathers. In mammals the cranium predominates and the nervous system, the neuroskeleton being the highest developed with a corresponding inferiority of the external and splanchnic skeletons. Carus divided the vertebræ into six portions, and the skeleton generally into this number or its multiples, while Oken adopted the number five.—Meckel did not materially affect the progress of philosophical anatomy, but he confirmed many previous principles and homologies by his minute and accurate descriptions, his knowledge of individual formations, and his history of development.—Prof. Owen has given the greatest extension to the science of philosophical anatomy in various writings and lectures since 1838, among which may be mentioned his various "Hunterian Lectures," "Lectures on Comparative Anatomy," "On the Archetype of the Skeleton," "On the Nature of Limbs," and "On the Principal Forms of the Skeleton and Teeth;" the last is the most popular, and has been reprinted from "Orr's Circle of Sciences" at Philadelphia (12mo, 1854). As far as the skeleton is concerned, the aim of philosophical anatomy is to discover the original idea which presided at its construction, or the archetype to which all the modifications of the vertebrate series can be referred. The archetype refers principally to the neuroskeleton, which alone appears to have any typical pattern; besides the other skeletons already defined by Carus, of which good examples (of the dermatoskeleton) may be found in the plates of the sturgeon, crocodile, and armadillo, and the carapace of the tortoise, he mentions a scleroskeleton, or bones developed in tendons, ligaments, and aponeuroses. His typical vertebra is here given:



In the above figure the names printed in Roman letters are the autogenous elements, or those which are ordinarily developed from distinct and independent centres; the names in Italics indicate the processes which are continuations of some of the preceding elements; the latter are the *diapophyses* or superior transverse processes, and the *zygapophyses* or oblique articular processes of human anatomy.

The autogenous elements enclose generally foramina which form canals in the vertebral chain; the most constant and extensive canal is that marked *n*, above the central body, for the lodgment of the spinal cord or neural axis, composed of the laminæ hence called *neurapophyses;* the second canal, marked *h*, below the centrum, is more irregular and interrupted, lodging the central vessel and the great trunks of the vascular system, and is formed by the lamellæ hence called *hæmapophyses*. On the sides of the centrum, most commonly in the region of the neck, is a canal circumscribed by the *pleurapophyses* or costal processes, the *parapophyses* or inferior transverse processes, and the *diapophyses* or superior transverse processes. Thus a perfect or typical vertebra, such as is found in the thorax of man and most of the higher vertebrates, and in the neck of many birds, with all its elements, presents four canals around a common centre; in the tail of most reptiles and mammals the hæmapophyses are joined to the lower part of the centrum, protecting only the artery and vein; but when the central organ of circulation is placed within it, the hæmal arch is largely developed, as in the thorax, where the pleurapophyses (ribs) are much elongated, and the hæmapophyses (costal cartilages) are removed from the centrum and placed on the end of the ribs, the bony circle being completed by the hæmal spine or sternum; the neural spine is the equivalent of the superior spinous process. He shows the fallacy of Cuvier's definition of a vertebra; the latter maintained that vertebræ have a special number of pieces arranged in a definite manner, looking more at their position in the series than at their composition; his prejudices against the vertebral theory led him into many untenable and contradictory statements and definitions. Cuvier divided the bones of the head into cranial and facial, making three annular segments of the former; the anterior comprised the frontal and ethmoid, the middle the parietals and sphenoid, and the posterior the occipital, the temporals being intercalated between the occipital, parietal, and sphenoid; he does not apply this to the lower vertebrates, in which it is most evident, nor to the face, or he would have found that these divisions do not include the same bones in all animals, the same being in one a cranial and in another a facial element; this again involved him in many inaccuracies and contradictions. Owen divides the endoskeleton of the human head into four segments, as follows, beginning behind: 1. Occipital or epencephalic vertebra, with the following composition: centrum (c.), the basi-occipital portion of the occipital bone; parapophyses (p.) and neurapophyses (n.), coalesced in the lateral or condyloid portions, the former marked by the ridge for the *rectus lateralis* muscle; neural spine (n. s.), the proper occipital bone; pleurapophyses (pl.), the scapulæ; diverging appendages (d. a.), the bones of the upper extremity; hæmapophyses (h.), the coracoid processes of the scapulæ; and hæmal spine (h. s.) deficient. The clavicle and first segment of the sternum, which complete the mammalian scapular arch, are the hæmapophyses and hæmal spine of the atlas or first cervical vertebra. 2. The parietal or mesencephalic, with c., the basi-sphenoid or posterior part of the body; p., mastoid processes; n., greater wings of spheroid; n. s., parietal bones; pl., styloid processes; d. a., greater cornua of hyoid bone; h., lesser cornua; and h. s., body of hyoid. 3. Frontal or prosencephalic, with c., anterior body of sphenoid; p., external angular processes of frontal (post-frontals of fishes); n., lesser wings of sphenoid; n. s., frontal bone; pl., tympanic portion of temporal; d. a., deficient; h., articular portion of lower jaw; and h. s., dental portion of same. 4. Nasal or rhinencephalic, with c., vomer; n., *ossa plana* of ethmoid; n. s., nasal bones; pl., palate bones; d. a., pterygoid and malar bones, with squamous and zygomatic portions of temporal; h., superior maxillary bones; and h. s., intermaxillaries. The splanchnoskeleton of the head consists of the petrosal and ear bones, the turbinated bones, and the teeth; the external skeleton consists of the lachrymal bones. These four cranial vertebræ, according to the organs of sense, would be: 1, auditory, related to the organ of hearing; 2, gustatory, with the organ of taste, whose nerve (gustatory or trifacial) pierces the neural arches of this segment or passes between it and the frontal; 3, optic, with the organ of vision between this and the nasal segment; and 4, olfactory, with the organ of smell always in front. Agassiz, in the first volume of his *Poissons fossiles*, arguing from the fact that the cephalic extension of the *chorda dorsalis* is arrested in the embryo fish at the region of the greater sphenoidal wings, maintained the "existence of only one cranial vertebra, the occipital, the rest of the head remaining foreign to the vertebral system;" this is refuted by Owen. Owen also combats the idea of Oken that the head is a repetition of the whole trunk; he maintains that the jaws are not the limbs of the head, but are the modified hæmal arches of the two anterior segments; the anterior limbs are diverging appendages of the occipital segment, and the posterior of the pelvic segment with its hæmal arch, both variously displaced from their hæmal arches in different vertebrates. The diverging appendages of the ribs of fishes, reptiles, and birds, arising from their posterior edge, are essentially limbs, rudimentary arms and legs, though they never become such. As the cranial segments are in number according to the cranial nerves of sense, so the development of the vertebral bodies and neural arches in the trunk depends on the junction of the nerves with the spinal cord; the condyloid foramen of the occipital bone gives passage in man to the hypoglossal nerve. The cranial bones of fishes are exceedingly complicated, and have taxed the ingenuity of most comparative anatomists, and tried to the utmost the patience of their readers; in his "Comparative Anatomy of Fishes" and "Homologies of the Vertebrate Skeleton," Owen labors very hard, and not always very satisfactorily, to reduce everything to his archetype. It will be interesting and instructive to give a few of the most striking characters of the skeletons of the different classes of vertebrates, according to Owen. In the fish not only the jaws, but the arms and legs, may belong to the skull, which accordingly is developed out of proportion to the rest of the body; the diverging appendages of the frontal vertebra are the chain of opercular bones, and of the parietal the branchiostegal rays; of the first spinal vertebra the pleurapophysis is short and simple, and the hæmapophysis is the clavicle; in the abdominal segments the pleurapophyses support simple rays as diverging appendages, and the hæmal arches are fibrous; the hæmapophysis of the pelvic segment is ossified into an ischium sustaining the ventral fins or posterior limbs, in some instances united to a rib; this pelvic arch is most remarkably changed in position, being as above mentioned in the so-called abdominal fishes (like the salmon, herring, and pike), or joined to the scapular arch as in the thoracic fishes (like the cod and perch families), according as the ischium is joined to the coracoid by a longer or shorter development. The bony and fibrous parts of the hæmal arches contract rapidly beyond the abdomen; the parapophyses increase gradually, curve downward, and complete the arch as in the cod, or the pleurapophyses contribute to form it with them as in *lepidosteus*, or the arch is closed by the former, with the latter anchylosed below and diverging at the points, as in the tunny. The bodies of some of the terminal segments in typical osseous fishes are consolidated together, and support several neural and hæmal arches and spines, which form the more or less expanded base of the caudal fin. The dorsal, anal, and caudal fins are folds of the skin supported on spines between the neural and hæmal spines to which the fin rays are articulated; they form no part of the typical vertebrate skeleton, and are peculiar to fishes. As compared to his archetype figure, the fish skeleton departs from it in the excess of development, principally in the diverging appendages of the cranium, and in the arrest of development in most of the other segments; the principle of repetition predominates, and the segments resemble each other more than in the higher classes. In the reptile skeleton, the hæmal arches of the anterior two cranial vertebræ, the jaws, are more developed, while that of the parietal is feebly so, and they are more or less displaced backward; in the occipital segment the hæmal or scapular arch is still further displaced backward and entirely separated; to it is attached an additional single bone, the humerus, and the divisions of the terminal segments are reduced to five, a number not surpassed in any of the higher vertebrates. A part of the body of the atlas is developed separately, and is united to the second cervical vertebra, forming the odontoid process; the nine segments after the cranium are cervical vertebræ, movably articulated, the hæmal arches not being ossified, and the pleurapophyses feebly developed, but free or floating; the nine to twelve following are dorsal vertebræ, the elongated ribs with the hæmal arch completing the circle, the pieces of which are movable; the next three are the lumbar, without free and bony ribs, but with hæmal arches; the next two, united, form the sacrum, bearing the pelvic arch, consisting of pleurapophyses (ilium), hæmapophyses (ischium and pubis), with the divergent appendages of the posterior limbs, a higher development than in fishes; beyond the sacrum all the vertebræ are caudal, in which the pleurapophyses become gradually shorter, a few of the first attached to diapophyses, and the hæmapophyses articulated between and to two vertebral bodies. In this class we see for the first time regions of the body. In the bird skeleton the premaxillary is much more developed than the maxillary, the reverse of what is seen in reptiles; the greater volume of the brain requires an increased cranial cavity, which is obtained by the expansion of the neural arches and spines without the addition of any new bones; the cervical segments have short and free pleurapophyses or ribs, which are early united to the neural arches, forming numerous simple vertebræ, and giving length and flexibility to the neck; the detached hæmapophyses of the atlas are usually joined at their extremities, forming a thin osseous arch, the furcular bone; in the thorax the latter are ossified into sternal ribs, the pleurapophyses being the vertebral ribs, bearing diverging appendages, pointing backward, which serve to unite the ribs and to render the thorax more solid; the hæmal spines of the anterior thoracic segments are developed into the broad sternum characteristic of birds, with its keel on the median line large in proportion to the powers of flight. The sacral region is greatly developed, both in the extent and in the number of bones firmly united to form it, and in its enormous pleurapophyses, especially the ilium; the sacrum includes some of the last dorsal, the lumbar, the sacral, and even some of the caudal vertebræ as limited in the reptile skeleton; after the sacrum come five or six caudal, more or less united, the last compressed laterally and directed upward. The pelvis has only two hæmapophyses, the pubis and the ischium, not united on the median line, except in the ostrich for the former and the nandou (*rhea*) for the latter, the rule being that the pelvis of birds is open below. The diverging appendages of the scapular and pelvic arches, or the anterior and posterior limbs, agree in having only two bones in the carpus and tarsus, and three united in the metacarpus and metatarsus, supporting in the former the second, third, and fourth phalanges, that of the second very rudimentary; in the metatarsus the three bones are, except in the penguins, united for their whole length, including also the two tarsal bones; the rudimentary metatarsal of the great toe is not anchylosed, and is directed backward, supporting the hind toe with two phalanges; the second toe has three phalanges, the third four, the fourth five, the fifth or little toe being wanting; by the number of phalanges we know that, in the African ostrich, the external or shortest toe of the two by its five joints is the fourth, and the internal the third, longer than the other, though having only four joints. In the mammal skeleton the cranial cavity is expanded, as in birds, chiefly at the expense of the neural spines, frontal, parietal, and occipital; but in most cases the squamous portion of the temporal bone forms part of the cranial walls; the occipital is articulated to the atlas by zygapophyses or condyles developed from the neural arches, and the hæmal or scapular arch is generally far removed from the skull; the hæmapophyses of the atlas, or clavicles, vary much in extent, in degree of ossification, and even in their presence; the pleurapophyses of the cervical vertebræ are very short, and are generally united to the other elements, circumscribing the foramen for the vertebral artery. The number of the cervicals is seven, except the alleged six in the manatee and the eight or nine in the three-toed sloth; this number depends on the existence of the diaphragm, &c., determining the number and distribution of the pairs of cervical nerves; in some whales and armadillos they are more or less consolidated. In the dorsals the pleurapophyses or ribs are movable, and the anterior ones are articulated between two vertebræ; the hæmapophyses are the costal cartilages, and the hæmal spines are generally a distinct chain of bones, in the highest consolidated into a sternum; toward the loins the pleurapophyses become shorter, and are attached to their respective vertebral centres and to the diapophyses; the hæmapophyses become shorter, and finally free and floating. The caudals vary much in number, size, and form; the short pleurapophyses in the anterior ones are developed at the end of diapophyses, and the hæmal arch, when it exists, is articulated directly to the bodies. The limbs (except in cetaceans, where the posterior are wanting) are much alike, whether adapted for flying, digging, swimming, running, or climbing, as will be seen under the homotypes below. In the fish and reptile the vertebral column is straight or nearly so; in the bird the skull forms a right angle with the neck, the latter having a sigmoid curve, and the tail bent upward; in the springing mammals, like the carnivora, there is a convergence of the spinous processes toward the eleventh dorsal, and in most there is a similar convergence toward the fourth cervical, these two regions being the centres of special movements of the column; in bulky animals, like the elephant, which move with a rigid spine, these processes are all inclined a little backward, as in crocodilians. In man the spine has several slight and graceful curves, destined to prevent shocks to the nervous system from movements incidental to the erect position; the curvature of the sacrum and of the coccyx are greatest compared with the number of vertebræ, and the anterior and posterior diverging appendages reach the maximum of development, especially the latter as compared to the length of the spine; the thumb, which is the least constant part in the rest of the class, becomes in him the most important, constituting a hand proper; in like manner the great toe, the first obliterated in other mammals, is characteristic of the genus *homo*, as on it depend principally the erect posture and biped gait of man; even the highest monkey has a posterior thumb instead of a great toe. In the class of serial homologies, or homotypes, may be mentioned the homology of the scapula with the ilium, the humerus with the femur, the ulna with the fibula, radius with tibia, carpus with tarsus, metacarpus with metatarsus, fingers with toes; in the skull, the basi-occipital, basi-sphenoid, presphenoid, and vomer are the homotypes of the vertebral bodies; the coracoid, superior maxillary, clavicle, pubis, ischium, chevron bones, sternal or abdominal ribs and cartilages, and tendinous intersections of the *rectus abdominis*, are all homotypes and hæmapophyses. This system of homotypes is far more natural, satisfactory, and intelligible than that of Oken, Spix, and Carus, who speak of the scapula, ilium, femur, humerus, &c., of the head, regarding each part as a repetition of the whole. —This is a fair representation of the principal points of philosophical anatomy, as given in the writings of Owen; in many points it is very unsatisfactory, and he labors very hard oftentimes to make out his homologies and to refer them to his archetype. With such sources of error and room for variation, it would be useless to expect perfect agreement among authors; from the nature of adaptive organization, it must be difficult if not impossible to reduce skeletons and their parts to unexceptionable laws; organic systems will not be bound down to any such narrow and clearly defined rules, and are constantly presenting to naturalists instances of inexplicable departure from what have long been considered natural laws. Philosophical anatomy will probably always be an uncertain and ever changing study, assisting but not constituting the science of anatomy. Admitting the four cranial vertebræ of Oken and Owen, there may still be recognized with equal propriety other vertebral centres in advance of the vomer, analogous to the coccyx at the other end of the column, with no nerves belonging to them. The reason for making four cranial vertebræ seems to have been, both with Oken and with Owen, the existence of four organs of sense in the head, auditory, gustatory, optic, and olfactory; on this principle there would seem more reason for the admission of only three. In the first place, there are three cerebral vesicles, corresponding to what become cerebellum, optic lobes, and cerebral hemispheres, or according to some anatomists the medulla oblongata may be substituted for the cerebellum; in the next place, there are only three special senses in the head, hearing, seeing, and smelling, taste being a compound sense, made up of smell and touch; the flavor of substances we get from the sense of smell, as the result of a common cold in the head or of artificially preventing the entrance of air by holding the nose sufficiently shows; the rest of the sense of taste is a delicate modification of the sense of touch, placed for protective purposes at the commencement of the alimentary canal; it is absent in many of the lower vertebrates, and has no more claim to be reckoned among the special senses than similar modifications of the sense of touch in the wing of the bat or in the genital mucous membrane; the origin, development, and mode of distribution of the gustatory nerve, which is only a branch of the fifth pair, moreover, are not such as belong to special sense organs. There are also only three sense capsules in the head, the petrous portion of the temporal bone, the sclerotic in the eye (as in the tunny), and the ethmoid for the sense of smell. As each vertebra of the trunk corresponds to a spinal nerve, there ought to be, according to the view here maintained, three pairs of nerves in the head; excluding the three special sense nerves, the first pair of cranial nerves would be made up of the *motores oculorum*, pathetic, external motor of eye, and the facial (or the third, fourth, sixth, and seventh) for the motor portion, and the fifth or trifacial for the sensitive portion; the second pair of cranial nerves has the glosso-pharyngeal and spinal accessory for its motor portion and the *par vagum* for the sensitive; the third pair of cranial nerves is the hypoglossal, which, though all motor in man, in reptiles (frogs) has the sensory ganglion of an ordinary spinal nerve; in the same manner in reptiles the seventh is seen to belong to the first, and the glosso-pharyngeal and spinal accessory to the second series. We have, then, three cerebral vesicles, three special senses, three sense capsules, and three pairs of cranio-spinal nerves, which would seem to indicate three cranial vertebræ, with a rudimentary nasal or other vertebral bodies in front, without nerves belonging to them, corresponding to the coccyx posteriorly. There is no regularity in the manner in which the nerves, both spinal and cranial, come out of the vertebral canal; the second cranial nerve comes out at the jugular foramen, between the occipital and parietal vertebræ; some of the nerves of the first pair make their exit from the cranium by the *foramina rotundum* and *ovale*, and some by the sphenoidal fissure, that is, both through the second and between the first and second; in the human spine the nerves come out between the vertebræ, but in the dorsals of many mammals they pierce the middle of each vertebra. As to the hæmal arches, Prof. Owen finds it very difficult so to divide his tympanic series as to get the hyoid arch and lower jaw as appendages to the second and third vertebræ; there is considerable doubt as to whether the diverging appendages of the cranial vertebræ are as yet properly determined. Admitting three cranial vertebræ, with a rudimentary fourth or nasal centrum, let the occipital segment claim the scapular arch; the lower jaw may be appended to the parietal and the upper jaw to the frontal segment, the hyoid arch, as Carus and others maintain, being placed with the tracheal rings in the splanchnoskeleton; or, leaving the hyoid arch in the endoskeleton (which is probably more correct), and pertaining to the parietal segment, the upper and lower jaws may be made the double hæmapophysial appendages to a single rib, as the ischium and pubis are to the ilium. There are some facts favoring the latter view, such as the development of both jaws from a single arch; in the cyclostome fishes the mouth is an arch, in which it is hard to say which part constitutes the upper and which the lower jaw; in *myxine* there is no under jaw, the inferior portion of the mouth being made up of the anterior part of the tongue bone.—Closely interwoven with embryology, philosophical anatomy, and zoölogical classification, is the idea first enunciated by Carus, and afterward extensively developed by Prof. J. D. Dana, that in the higher groups of animals the more important parts of the structure are centralized in the head—called by Dana cephalization. He first applied this idea as a principle of classification in his "Report on the Crustacea of the Exploring Expedition" in 1852; he afterward very fully explained his system in the "American Journal of Science" for 1856, 1858, 1863, 1864, and 1866, inventing a great number of new terms which cannot be introduced here; those interested can consult the above mentioned volumes. The fundamental idea is the higher centralization or cephalization of the superior grades of animals, and the less concentrated central forces of the inferior; in the higher groups the centralization contributes to the head functions, or those of the senses and the mouth; as we descend in the animal scale, the head loses one part after another for purposes of locomotion. This cephalization is manifested in the nervous system and in the members of the body. Intimately connected with this is the element of size, which is an important one in animal structure; in the crustacea, especially, diminution of size generally accompanies a departure from the centralization of the organs in the head, and the increased development of the thoracic and abdominal regions. The same relation of cephalic predominance is as apparent in the embryological development of an individual animal as in the comparative rank in the various groups. In ordinary mammals both the anterior and posterior limbs are organs of locomotion, but in man the anterior are transferred to the cephalic series, serving the purposes of the head; the cephalization of the body, therefore, in him reaches the extreme limit, justifying his elevation by Owen in a group by himself, the *archencephala*. Dana maintains that cephalization is a fundamental principle, as respects grade, in zoölogical life, and throws great light upon classification. The term decephalization he applies to the opposite or descending gradation, in which members are transferred from the cephalic to the locomotive series, with elongation of the thorax and abdomen. Prof. E. S. Morse, in the "American Journal of Science" for 1866, applies this system to the classification of mollusks.—Though Owen's conclusions are accepted by most anatomists as coming nearest the truth, Mr. Maclise, in the article "Skeleton" of the "Cyclopædia of Anatomy and Physiology" (vol. iv., London, 1852), looks at the osseous framework from another point of view, and comes to very different results, at only a few of which can we glance here. He denies that there is any such *ens* as a typical vertebra, and maintains that vertebræ are unequal quantities, varying in different regions of the trunk; according to him, the cervical, lumbar, and sacral vertebræ develop costal appendages as well as the dorsal; the first seven thoracic costo-vertebral figures are complete, and all other parts of the mammalian spinal axis are more or less modified from this archetype. The fore limbs are homologous to one another and to the posterior limbs; the scapula and ilium are the homologues of the posterior laminæ of a dorsal vertebra, the acromion and inferior iliac spinous processes correspond to transverse processes, and the head of the humerus and femur to the head of a rib.—In 1864 Prof. Huxley instituted a new comparison of limbs, placing them in the position they assume in the embryo, but adopting the view generally maintained in Europe, that their relation is one of parallelism and not of symmetry, or that homologous parts look in the same direction. The opposite view, that of symmetry, or that homologous parts look in opposite directions, has been extensively adopted by American anatomists, and notably by Jeffries Wyman and Dr. Wilder. Prof. Wyman, in a paper on "Symmetry and Homology in Limbs" ("Proceedings of Boston Society of Natural History," vol. xi., 1867), maintains that the fore and hind limbs are not parallel repetitions of each other, like two ribs on the same side of the body, but are symmetrical parts repeating each other in a reversed manner from before backward, as right and left parts do from side to side. He drew attention to the remarkable analogy between symmetry and polarity, thus explaining both normal and abnormal development. He holds that the two ends of the body repeat each other, without meaning thereby that the head and pelvis repeat each other, as Oken maintained. He denies that the scapular arch is a modified rib belonging to the occipital vertebra, and believes that limbs are not dependencies of the scapular and pelvic arches, but belong to the category of tegumentary organs, their connection with the vertebral column being secondary, like that of the teeth with the jaws. In opposition to the views of Owen, he regards the radius as homologous with the fibula, and the ulna with the tibia. Prof. B. G. Wilder, in his papers on "Intermembral Homologies," in the "Proceedings of the Boston Society of Natural History," vol. xiv., 1871, and of the "American Association for the Advancement of Science," 1873, combats the old idea of parallelism of limbs, or that the thumb is the homologue of the great toe, &c., and substitutes that of symmetry, maintaining with Prof. Wyman that the above example is simply one of analogy, and that the true homologue of the thumb is the little toe. He has coined many new and expressive words, his "tools of thought," for the study of the nature and homologies of limbs; he seeks to prove that the cephalic and caudal regions are comparable with each other as are the right and left sides; that the anterior and posterior limbs are appendages respectively of these regions; and that an anterior limb is comparable with a posterior, as the two anterior or the two posterior are comparable with each other. He gives a bibliography of the subject of philosophical anatomy, to which the reader is referred for the views of writers, both European and American, which cannot be alluded to here.

PHILOSOPHY (Gr. φιλός, loving, and σοφία, wisdom), the universal and absolute science, aiming to explain phenomena by ultimate causes; to grasp the nature of real as distinguished from phenomenal existence; to systematize the forces and the laws which prevail in the activities of God, man, and nature; to reduce the universe to a principle of unity; and to exhibit at once the impulse and the goal of destiny. The origin of the name is attributed, on questionable authority, to Pythagoras, who preferred to be called a philosopher, or lover of wisdom, rather than a sophist or sage. It was appropriated and first popularized by Socrates, who made it the distinctive appellation of his teaching in contrast with the arrogant designation of the sophists. Originally assumed in modesty, the term did not retain its etymological and Socratic meaning, but returned to that of σοφία, or wisdom. Among the most significant definitions of philosophy are the following: "the knowledge of things divine and human" (attributed to Pythagoras); "a meditation of death" (μελέτη θανάτου), and "a resembling of the Deity in so far as that is possible to man," also "search after true knowledge" (Plato); "the science of being," or of that which underlies all other sciences (Aristotle); "that part of human learning which hath reference to the reason" (Bacon); "the science of things, evidently deduced from first principles" (Descartes); "the science of effects by their causes, and of causes by their effects" (Hobbes); "the science of sufficient reasons" (Leibnitz); "the science of things possible in so far as they are possible" (Wolf); "the science of the connecting principles of nature" (Adam Smith); "the science of truths, sensible and abstract" (Condillac); "the science of the relations of all knowledge to the necessary ends of human reason" (Kant); "the science of the original form of the Ego, or mental self" (Krug, with which that of Fichte substantially agrees); "the science of the absolute, or of the absolute indifference of the ideal and real" (Schelling); "the science of reason, in so far as the latter is the conscious idea of universal being in its necessary development" (Hegel); "the substitution of true ideas, that is, of necessary truths of reason, in place of the oversights of popular opinion and the errors of psychological science" (Ferrier); "the knowledge of effects as dependent on their causes" (Sir William Hamilton); "the science of first principles, that, namely, which investigates the primary grounds, and determines the fundamental certainty, of human knowledge generally" (Morell); "the science of the ultimate principles and laws of nature and fredom, as also of their mutual relations" (Tennemann); "the science of the reason of things" (Alaux); "the explanation of the phenomena of the universe" (Lewes); "the thinking consideration of things," or "reflection" (Schwegler); "the science of principles" (Ueberweg). From these definitions it will be seen that the term philosophy, which first appears in Greek literature in Herodotus, has retained a generic significance, modified by special application. According to Plato it is the search for wisdom, or true knowledge, which he distinguishes from belief or opinion founded on the evidence of the senses. With the reality underlying all sensible forms wisdom is alone concerned, and to ascertain and acquire this is the task of philosophy. This grasps what is immutable and eternal, in which are included alike all truths of mathematics as well as of theology. Philosophers "set their affections on that which in each case really exists." Aristotle holds that, as all sciences deal with distinct departments of existence, there must be a science which deals with the reality that underlies them all, or being as such, and this science he terms his "first philosophy." Philosophy therefore is equivalent to a knowledge of things in their origin or causes, a view substantially accepted by Sir William Hamilton. The usage of the term, however, especially among the stoics and ethical writers, has been in the subjective sense of Plato, and has been applied to the sagacity or disposition best adapted to solve the problems of practical life. In this case the moral element has predominated over the intellectual. But as applied to systems of thought or speculation, the term has been used in an objective sense, and has been equivalent to a theory for the explanation of phenomena, whatever these might be, whether related to God, the origin and order of the world, or the constitution, powers, and destiny of the human soul. In each instance there is an effort to trace things to their causes, to study them in their connections, to interpret them to the reason, and through their multiplicity to discover the higher unity that underlies them.—*Method.* The rational progress necessary to this end constitutes method in philosophy. This is the same whether we seek to discover causes or to resolve the manifold into unity, since as we ascend from cause to cause we approach the unity of which we are in search. Method then involves two correlative processes, known as analysis and synthesis; the first fundamental, and in order to the latter. Having before us the complex of phenomena, as they are presented to sense or consciousness, we analyze them, or examine the distinct elements of the complex object, that we may apprehend them individually. Synthesis receives these elements from analysis, and recomposes them, on the basis of common qualities or relations in the elements themselves. Thus analysis selects from the infinity of objects those to be considered, from which a general law may be inferred, and this inference, known as induction, is pronounced by Hamilton to be "purely a synthetic process." Analysis and synthesis are dependent upon each other, and either alone would be incomplete. They answer, as terms, to Bacon's "observation and induction." A more minute statement of the actual procedure in philosophizing has been: 1, observation; 2, hypothesis; 3, questioning; 4, induction; but all are implied in analysis and synthesis.—*Domain.* The domain of philosophy is the universe of phenomena, including facts of consciousness, so far as they come or can be brought under human cognizance. Instead of being limited to a single department, like a special science, it includes all departments of knowledge. Theology, as Plato held, comes within its sphere, so far as its facts or doctrines are objects which reason can examine or explain. This is the case also with ethics. But a distinction must be made. Philosophy is not to be identified with religion or science, while religious truth, as such, is addressed rather to the intuitions of the soul than to the speculative reason, and expounds the duty of man and the dogmas postulated by revelation, upon which that duty is based; and while science searches out facts in its own sphere, and by inductive processes discovers the law under which they are classified, or the theory to which they conform, the sphere of philosophy comprehends both, accepting their facts, intuitions, or laws as its data, and studying them in their causes and relations, in connection with the question of their ultimate significance. Science, limited to its special domain, where kindred facts are to be classified or coördinated, asks only what and how. Philosophy, accepting all facts and phenomena, whether as yet scientifically classified or not, passes beyond the sphere of science, asking the why of things, and searching out their causes, connections, and consequences, with a view to the "interpretation and justification of phenomena to the reason, showing their rational grounds, principles, laws, and ends." Thus resolving the manifold of phenomena into a higher unity, and directing its attention especially to what is most important and fundamental, it cannot be content, as Lord Bacon has said, but with the highest themes—God, nature, and man.—*Divisions.* A division of philosophy frequently adopted has been that of pure and applied, or speculative and practical. It was adopted by some of the ancient philosophers, by Wolf and Herbart among moderns, and in a peculiar sense by Kant, but was rejected by Hamilton, on the ground that the distinction is not always applicable, the theoretical being often practical also. Æsthetics has sometimes been classed with one, sometimes with the other, or with both; and in regard to other branches of philosophy, the same difficulty exists. With the stoics, all philosophy, as ethical, was practical. Plato himself adopted no uniform division of philosophy, although his commentators have endeavored to base one upon his distinctive discussions of the true, the good, and the beautiful, designated respectively as the critical, the practical, and the æsthetic. His subjective definition of philosophy as the pursuit of true knowledge led him to class together the most diverse departments, including mathematics, ethics, political science, theology, &c., under the same appellation. Aristotle likewise includes mathematics, physics, ethics, and politics together under the same generic term, reserving his "first philosophy," or science of being, for what is now termed metaphysics. This he made to be the science which treats of the ultimate grounds or principles of everything that exists, considered in relation to its "four causes:" matter, form, efficient causes, and end. Yet mathematics, physics, and theology are with him the three "theoretical philosophies," while ethics, in the broad sense of the word including political science, belongs to the practical sphere. It is his "first philosophy" that goes back of all other philosophies, or rather philosophical sciences, which have their special spheres, and investigates what they must accept hypothetically, viz.: being as such. If there were only physical beings, physics would be the first and only philosophy. But if there is an immaterial and unmoved essence which is the ground of all being, there must be an earlier and therefore universal philosophy. This first ground of all being is God, and therefore Aristotle sometimes calls his "first philosophy" theology. While sometimes accepting the distinction of speculative and practical, he is less inclined than some of his commentators to any formal division. At different periods philosophy has limited or extended its sphere, and has essayed the solution of diverse problems, inconsistent with any uniform classification. Subsequent to the revival of learning in Europe, and especially since the time of Descartes, there has been a growing disposition to limit philosophy to metaphysics, and exclude from it much that it once embraced. The result has been that the number of subordinate distinct sciences has been multiplied, some of these taking the name of philosophy, as the philosophy of history, language, grammar, rhetoric, government, religion, &c. But philosophy proper still retains the superior sphere. Its themes are still, as Bacon held, God, nature, and man. Mental science and physical discovery have supplied it new material. Logic, which some would make a part of it, is considered by others as merely its instrument. By Wolf as well as by later German writers, it is considered as propædeutic. He bases his distinction of speculative (metaphysics) and practical philosophy on the faculties of cognition and volition; moral philosophy, economics, and politics falling under the latter, and ontology, cosmology, psychology, and natural theology under the former. Herbart expressly isolates the particular philosophical sciences, and rigorously separates theoretical and practical philosophy. He censures attempts at unity, ascribing to them a variety of errors, since logical, metaphysical, and æsthetical forms are in his view disparate. Hegel, with others, makes the distinction between the theoretical spirit (intelligence) and the practical spirit (will). Nevertheless the attempt boldly essayed by Spinoza to resolve the duality of philosophy (specially illustrated by the theories of Descartes and Kant) into a higher unity has been renewed during the present century by German philosophers, asserting the identity of subject and object (the Ego and the non-Ego), or constructing a philosophy of the absolute, which can find its developed application in all spheres, theoretical and practical. To the sphere of philosophy, however, by general concession, belong ethics (see MORAL PHILOSOPHY), psychology, ontology, cosmology, and natural theology, each often so closely connected with the others as to be in some measure dependent upon them. Psychology investigates mental phenomena, the facts and laws of consciousness, and the constituent faculties of the soul in themselves and their relations. Ontology covers the ground of Aristotle's "first philosophy," and is a synonyme for the science of being. Cosmology treats of questions concerning the contingency or necessity of the world, its eternity or its limitations in space and time, and the formal law of its changes, extending also to questions concerning human freedom and the origin of evil. As exhibited by Wolf, it professes to deduce from ontological principles a demonstration of the nature of the world, and the manner in which it is produced from simple substances. Natural theology considers questions pertaining to the existence and providence of God, and the moral order of the world.—Psychology, although a modern term, first employed in a technical sense by Otto Casmann in 1594, dates from the time when the νοῦς of Anaxagoras invited the attention of Socrates, who turned it from speculative to practical account. In the writings of the Old and the New Testament we have the germs of a psychology, traceable also in other monuments of ancient literature. In these, as well as in the sacred writings, the distinction of body, soul, and spirit (σῶμα, ψυχή, and πνεῦμα) is noted, the last term answering, as some contend, to the Aristotelian νοῦς, while ψυχή is equivalent to "the vital and Phantastic soul," and σῶμα is vitalized matter. Plato, in several of his dialogues, discusses the nature and powers of the soul. One of Aristotle's works was entitled Περὶ Ψυχῆς, and his view of its relation to σῶμα accords with his theory which makes God supreme over the universe. From his time psychology made little advance for many centuries. The nature and destiny of the soul, rather than its faculties, engaged the attention of the early Christian writers. With the scholastics, who often blindly followed Aristotle, psychology, as well as philosophy generally, was made subordinate to the interests of faith. In England, during the 17th century, the leading writers on psychological questions were Sir John Davies, Bacon, Hobbes, and Locke. The last named had been preceded on the continent by Montaigne, Descartes, Pascal, Malebranche, Spinoza, and others of less note. From the time of Descartes, who posited as the starting point of philosophic certainty the argument, *Cogito, ergo sum*, and who emphasized the distinction between mind and matter, two tendencies have been manifest in philosophy, which there have been repeated attempts to harmonize, the idealistic and materialistic, to which reference will hereafter be made.—Ontology dates from the time of Aristotle. It has been defined by some as that part of philosophy which treats of what are now called categories, or radical notions of thought applicable to all objects. Aristotle was not only the first to posit absolute being as the proper subject matter of the "first philosophy," but to draw up a table of principles, empirically derived, which were termed categories, and in accordance with which all conceptions must be formed. Among his modern imitators are Kant, Wolf, and Hegel. The ontological argument for the being of a God, hinted rather than drawn out by Augustine, is developed by Anselm, who holds that the very notion of a good, a greater than which cannot be conceived, existing in the mind, implies an objective reality. In this line of thought he is followed to some extent by Descartes, whose argument is substantially: Since I am finite, the idea of infinite substance could not be in me if this idea did not come from a really existing infinite substance. To this he added: I myself, who have the idea of God, could not exist without God; and this idea is innate in me, in the same sense as the idea I have of myself. In later times the *a priori* argument for the being of a God has been elaborated by Dr. Samuel Clarke (1704), W. Gillespie (1854), and others. But it has been met by the objection that it is not strictly *a priori*, since antecedent existence of some kind is the postulate of the argument.—Cosmology, investigating the physical and moral order of the universe, has produced a large amount of speculation, and made large contributions to literature. At a very early period the relation of God to the world is shadowed forth in cosmogonies and popular religious systems. Zoroaster has been credited with an explanation (which may have been anterior to him) of the existence of evil in the world, which falls back on the theory of two superhuman principles, a good and an evil deity, for ever opposed. Something of a kindred nature is found in connection with Greek speculation, and is known as hylozoism. Matter is the impracticable resistant principle, which cannot easily be moulded, and has in it the elements of imperfection and evil. Hence, as Plato said, "Reason persuades necessity." Under a somewhat modified form, the Persian doctrine was revived by Mani, and has been since known as Manichæism. It supplied an element of the Gnostic systems, and previous to his acceptance of Christianity was embraced by St. Augustine. During the middle ages it exerted a limited influence, but toward the close of the 17th century attention was called to it by the speculations of Peter Bayle. The favor with which he was disposed to regard it led Archbishop King to write his famous work on the "Origin of Evil." On this and kindred topics Leibnitz soon after presented his views, and his work bore the title of "Theodicy." In that line of discussion which he pursued, and in which he has been followed by numerous more recent writers, were involved nearly all the leading cosmological questions, including liberty and necessity.—Natural theology, as a branch of philosophy, may be traced in Greek literature to the νοῦς of Anaxagoras. Socrates gave it a moral and religious significance. Aristotle's speculations were necessarily theistic, from his philosophical standpoint and his theory of causes. Moreover, it came to be widely felt that back of all motion there must be a mover, himself unmoved, and back of all proximate causes, dependent in their nature, there must be a first cause. Of this cause, to meet the demand of philosophy, unity must be predicated; and to this fact may be attributed that tendency to monotheistic speculation which betrays itself among some ancient writers, even when surrounded by polytheistic influences and institutions. This is manifest in the writings of Plato, as well as of many of the stoics. Seneca identifies providence, nature, and fate with God. The natural theology of Socrates is substantially reproduced in Cicero's *De Natura Deorum*, in which also we meet the argument from design for the being of God, illustrated by a memorable passage which Cicero quotes from Aristotle. The theism of Epictetus and Plutarch is that which recognizes a supreme personal intelligence, while that of Antoninus approximates to pantheism. The atomic philosophy, originating with Leucippus and Democritus, and adopted by Epicurus and his poetical expositor Lucretius, was regarded as atheistic, although Cudworth asserts strenuously that it may harmonize well with theism. Neo-Platonic as well as much of Gnostic speculation adopted the theory of emanations from the Supreme Deity who could not come in contact with matter or imperfection, and to the emanating æons the works of creation or providence were ascribed. Among some of the Arabian scholars, and also in a few of the scholastics, we discern pantheistic tendencies. These also assert themselves in some of the continental writers of the 15th and 16th centuries, but they reach their culminating point in Spinoza, by whom the previously asserted dualism of mind and matter is reduced to the one original universal substance which he calls God. From his time the writers on natural theology have been numerous. Howe, Boyle, Bentley, Ray, and several members of the royal society are among the authors of the closing part of the 17th century. Derham, Nieuwentyt, Cheyne, and many of the Boyle lecturers belong to the early part of the next century; while more recent authors in this department have been Paley, Fergus, Chalmers, Brougham, and the writers of the Bridgewater treatises. Much of the matter which they have contributed to the literature of natural theology would have been classed as philosophical by ancient standards. The criticisms on the various kinds of argument urged for the being of a God have been numerous, and form an important element in modern philosophical literature. — Pantheism, as distinguished from theism, asserts the consubstantiality of God with nature. Its rudest form is a universal fetichism. In its philosophical development, it makes God the one substance, of which all phenomena of mind and matter are but the modes or attributes. He is the impersonal Absolute, who sleeps in the mineral, dreams in the animal, and wakes in man. God is nature, pervaded and inspired by an immanent principle; and nature is God, in the manifestation of his essence or the evolution of his power.—*Development.* The attempt has repeatedly been made to reduce philosophy, historically considered, to certain uniform laws of development. The actual progress which it has sometimes made, at certain periods in a marked degree, has favored this attempt; while its frequent relapse and resumption of antiquated positions and opinions has seemed to indicate that no such laws, even if they had actually operated, were discoverable. Schelling held that the various parts of philosophy, and philosophy itself, must be exhibited in a single conformity as the advancing history of consciousness; while Ritter's professed object in his "History of Philosophy" was, while adhering strictly to facts, to present it as a "self-developing whole." This, however, does not come up to the idea of Hegel, who would regard the history of philosophy in the unity of a single process. He contends that the nature of things is such that the historical sequence of the various philosophical standpoints must, without essential variation, accord with the systematic sequence of the different categories of logic. In other words, free the fundamental thoughts of the various systems from what is adventitious, or formal and locally applicable, and we have the various steps that mark philosophical progress. In opposition to this, it is contended that history combines liberty with necessity, and presents a play of endless contingency; and moreover, that the historical and logical developments of philosophy do not, as a matter of fact, coincide; the logical process being from the abstract to the concrete, while the history of philosophy is from the concrete to the abstract, so that what is really first in itself is really last for us. Rejecting therefore the assumption that the evolution of philosophy in history must correspond to the evolution of logical philosophy, we are compelled to recognize the physical, psychological, and ethical questions which it has raised, as marking the stages of its advancement. No exact order of philosophical development can be laid down *a priori*, and we find as a historical fact that no such order has been observed. Many of the gravest questions of modern philosophy were discussed in the early centuries, and sometimes with an acuteness which has perhaps never been surpassed; while, as noted by Ritter in his account of the Neo-Platonists, the progress of philosophical development, after reaching a certain point, has either become retrograde, or like a circle renewed its former round. Still, though philosophy has had assigned it various problems, often but remotely connected, and at the same period has been engaged in different spheres of thought, and though some of its questions not only are hitherto unsolved, but may prove ultimately insoluble to human reason, we can yet discern an order, although by no means logical or continuous, of progressive development. "Wonder," says Aristotle, "is the first cause of philosophy." Hence the heavenly bodies and the forces of nature are first to be considered, and the earliest philosophies are mainly the cosmogonies embodied in the ancient mythologies. But as the operation of natural causes is discerned, the mind is impelled to the study of conditions proximate to the result observed, and here we have the explanation of the earliest Greek (Ionic) philosophy. As the proximate causes are found to be not self-originating, or are seen to be inadequate, their existence and operation must be explained, and we thus pass from Ionic speculation to the νοῦς of Anaxagoras. This, at first regarded as a *deus ex machina*, rises into special importance in the teachings of Socrates, when he connects it not merely with the physical but the moral order of the world. Thus he legitimates the theory of his predecessor by putting it to broader and better use, and justifies the claim made in his behalf that he had brought down philosophy from heaven to earth. In him, but eminently in his pupil Plato, the reaction against the sophists—denying moral distinctions, and representing all things as illusive—is distinctly seen. Plato asks after the reality underlying all phenomena, but in doing this he has to consider the capacity of man to know the real. The relation of the constitution and powers of the soul to sensible phenomena, or to actual cognition, must necessarily be taken into account, and a line of discussion is entered upon which Aristotle also follows up. The result is twofold: on one side, doubt and distrust, as illustrated by the academics, or even a despair and surrender of all philosophy as futile; and on the other, a restriction of reason, which has speculated to little purpose, to matters of practical life. Here again there are two classes of thinkers: one finding wisdom, with Epicurus, in practical prudence and a shrewd calculation of the utilities, of pleasure and pain; while another (the stoics), retaining the high sense inspired by the earlier teachings of philosophy of the dignity of the soul, are indisposed to capitulate to obstacles and hardships, and count that disposition of mind and heart which defies them in the strength of virtuous resolve to be the highest philosophy. At this point we find speculation modified by contact with Christianity and oriental elements. The relation of the Supreme Deity, as transcendental and absolute, to creation is a new problem, which gives birth to Gnosticism, and determines the development of Neo-Platonism. Christian dogmas, authoritatively proclaimed, limit the sphere of speculation, and present their solution of the gravest problems of providence and human destiny, which are declared to be above the sphere and capacity of human reason. But in the conflict with paganism, Christianity sometimes accepts the alliance of Platonism, and in the writings of St. Augustine we have, along with the attempted refutation of pagan, the introduction of what may be considered the first approximately perfect scheme of Christian philosophy. Until the revival of learning, the ancient philosophies, imperfectly apprehended, are studied, often with little original thought, and are modified to meet the demands of reason, silent and submissive before dogma, but intent to settle the conditions and terms of its submission. Studied under the new conditions of mental activity in the 15th and 16th centuries, the philosophies of Plato and Aristotle were accepted as bases of speculation, but in the 17th century they began to give place to original thought. Bacon broke the way in which others were ready to follow, indicating the true methods of philosophy, rather than constructing a system of his own. Descartes broke still more completely with the past, taking skepticism as his starting point. From his time the psychological element has predominated in philosophy. He laid the foundation for the later idealism, and, in his dual division of the existent into mind and matter, prepared the way for the monism of Spinoza, the preëstablished harmony of Leibnitz, and the speculations of Locke. Conditions of race, climate, and natural scenery, as well as forms of government and religion, and national tastes and capabilities, have all exerted their influence in determining the order of philosophical development; and yet, as a rule, each generation has built on the foundation laid by its predecessor, but reconstructed often to meet its own necessities.—*Schools.* The term school, as applied to philosophy, is sometimes used in a specific, but often also in a more general and indefinite sense. When its application is local or national, as when we speak of the Hindoo, Greek, scholastic, Scottish, French, German, or Italian philosophy, the unity that is predicated of each belongs not to the views maintained by the different thinkers who composed it, so much as the class of topics which they discussed. In other cases, as when we speak of the nominalists or realists, idealists or materialists, Platonists or Aristotelians, stoics or Epicureans, the term has a more specific and exclusive significance. It belongs to a class of thinkers who are agreed as to the method and tendency of a system.—*History.* In connection with the following brief outline of the course of philosophy, a much more complete and somewhat continuous history may be obtained, by consulting in this work the numerous biographical and other articles bearing upon the subject. In India, speculation on the great problems of philosophy, if not the most ancient, is, among the ancient, the best known. As among other early nations, we here find philosophy combined with theology, or involved in myths. The germs of it must be sought in the Vedas (probably composed before 1000 B. C.), the laws of Manu, and other sacred writings. Associated with much that is superstitious, it possesses elements indicative of patient and profound thought. With a gross idolatry it combines an ideal pantheism, not unlike that wrought out by German thinkers. Its standard of human perfection is abstraction from matter and absorption in God. Creation is an illusion, and spirit is the only substance. Appearances in nature are manifestations of God, and all life, even in the worm, is sacred. The Upanishads speak of the Divine Self, the Eternal Word, not to be grasped by reason, but only by him whom He himself grasps. In the beginning was the Self alone, concealed in his own qualities. In the first book of the laws of Manu we have a Hindoo cosmogony. The Self-existing Power created the waters with a thought. A productive seed placed in them becomes an egg from which heaven and earth are developed, while from the Supreme Soul mind is produced. The last book of the laws of Manu presents the doctrines of transmigration and final beatitude. With these common features, Indian philosophy develops into the three systems, the Sankhya, Nyaya, and Vedanta. All agree in proposing the same speculative problem: How did the universe come to be? and in aiming at the same practical end, the deliverance of the soul from the evil of the world, or from an existence conditioned by time and sense. All make the visible and sensible a delusion and a snare, accounting the ideal the only reality. A perfect knowledge of the real is the means of deliverance from the unreal and from restless transmigration. The Sankhya philosophy accepts two eternal and uncreated substances, soul and nature; the Nyaya three, atoms, souls, and God; while the Vedanta, or Mimansa, that orthodox and probably oldest system, teaches that Brahm is all, the one being in the universe, and that all else is *maia* or illusion. The wise man is he who by knowledge escapes the snare of the unreal, and triumphs over his own desires. By pure contemplation he attains to freedom and repose, becoming united at last with Brahma, in whom he is only conscious of himself as the eternal and universal Brahma, while life and death, with all their changes, are but phantasies. To this result worship may be tributary, but it is subordinate to knowledge. Action, inasmuch as it implies desire, is vain. The substance of the soul is from Brahma, and it is neither born nor does it die; yet not all souls return to him. Those only who attain to the knowledge of him will be absorbed in him; others are doomed to ceaseless transmigration. In absorption, or the total loss of personal identity, is the highest bliss. This is reached by entire abstraction, not only from the senses, but from the thinking intellect. Consciousness of some sort, however, would seem to remain, since the delivered soul can say, I am Brahma; I am Life. The Sankhya philosophy, recognizing soul and nature, denies that a perfect being could create the universe. This would imply desire on his part, and consequently imperfection. The names of the gods are retained, but they are finite, though superior beings. Nature has a plastic creative force, but is not intelligent. Souls are intelligent, but do not create. Both are eternal, and from their union proceeds the visible universe. The Nyaya doctrine recognizes a supreme soul, Brahma, all-mighty and all-wise. It holds all souls to be eternal and distinct from body. It introduces atoms, a third eternal and indestructible element, as the basis of matter.—Buddhism was a rationalistic revolt from Brahmanism with its superstitious rites and burdensome ceremonies. Its founder, Sakyamuni (probably about the middle of the 6th century B. C.), rejected the authority of the Vedas, sacrifices, and all Brahmanic rites. It retained and popularized the principles of the Sankhya philosophy, by which it was largely shaped. It held that all existence, as subject to change and decay, is evil; but this evil, springing from desire, is not inevitable, since desire may be extinguished. Thus, if men choose, they may arrive at or attain to *Nirvana*, or the perfect rest. What this is, whether the extinction of existence or of all passions and desires, has been disputed, and plausible arguments have been urged on both sides. But whatever the end, the moral precepts of religion direct to its attainment. The loftiest conception of Buddhism is the deified man who has entered Nirvana. He becomes the object of adoration, to whom prayer is addressed. The metaphysical doctrines of the system are *dharma* or the law of consequences, which attends being like its shadow until the final and changeless is reached, and the Nirvana, which to the Buddhist means the absolute eternal world, beyond space and time, identified with an end of transmigration, as well as of the restlessness of desire.—Of Chinese philosophy we know nothing anterior to the time of Confucius. The oldest Chinese writings recognized one Supreme Being, commanding good, forbidding evil, and extending his providence over men. In the course of ages this ideal had become obscured and lost, or associated with superstitions which Confucius declined to recognize. Although silent as to the existence and attributes of God, as well as the immortality of the soul, he says: "Worship as if the Deity were present." His philosophy was mainly ethical. It was given, or at least preserved, in detached aphorisms, inculcating virtuous actions and pure morals. The first marked period in the development of his philosophy closes with the death of Mencius about 300 B. C. Its second extends from A. D. 1034 to 1200; it arose in connection with the teachings of Choo-tsze, through which it assumed a more definite form. It held that there is one supreme and ultimate principle of all existence, which is absolutely immaterial, and the basis of the moral order of the universe. From this, eternally operating, comes all animate and inanimate nature. Creation is a perpetual process, and matter and spirit are opposite results of the same force, now pulsating actively and now passively. The highest and most perfect result is man, originally good, while evil results from conflict with the outer world. If he follows the dictates of his nature, his actions are right and his life is harmonious. He may finally conquer all obstacles to his perfection, since by solitary persistent thought one may penetrate at last to the essence of things. Another system of philosophy, more speculative than that of Confucius, at least in its original form, is that of Lao-tse. It starts with the Tao, or unnamable, the origin of heaven and earth, "the mother of all things." It is universally present, invisible, inexhaustible, before the gods, without desires, and into it all beings return. With this attempt to grasp the ideal absolute are associated other paradoxes, as: everything proceeds from its opposite, being is the source of non-being, together with other apophthegms, that remind us of Plato's "Phædo" or the speculations of Hegel.—Among the Perso-Median races, philosophical speculation is closely connected with religious belief. Its germs are found in the fundamental doctrines of the sacred writings, the Zend-Avesta, ascribed to Zoroaster, but of uncertain though very ancient date. The world, in which evil is in perpetual conflict with good, is the great problem to be solved. The evil cannot come from the good deity, Ahura Mazda (Ormuzd), and hence an evil principle, temporarily of approximately equal power, must exist by whom the good is opposed and the evil introduced and favored. This evil deity, Ahriman, serves to explain the problem of the origin of evil, and emphasize the moral as well as the physical antagonisms of creation. The conflicting elements of present existence throw their shadow over the future, where the reward is as blissful as the retribution is bitter. It is not strange that long after Zoroaster, and in the 3d century of the Christian era, his main doctrines should have been adopted by Mani as the basis of the sect which he founded.—Egyptian philosophy, whatever it may have been, has left few traces of the speculative element. We must seek "the wisdom of Egypt" in theosophy and ethics. The first eight Egyptian gods seem to represent a process of divine development or emanation. They constitute something like a transition from the absolute spiritualism of India to the religion of nature and humanity of the western nations. There is some ground for regarding Egyptian mythology as a compound of which the elements were contributed by a native and an invading race. Ammon, the chief god of Upper Egypt, is the head of a cosmogony which proceeds from spirit down to matter; while Ptah, the chief god of Lower Egypt, is at the beginning of a cosmogony which ascends by a process of evolution from matter up to spirit. Ptah is heat, and from this proceeds light; from light, life; and from life, gods, men, plants, animals—all organic existence. Of the third order of the gods, the circle of Isis and Osiris, Herodotus says, "They are the only gods worshipped throughout Egypt." They are supposed to represent the original religious belief of the native element of the population, and as such symbolize the forms and forces of outward nature. In the time of Plutarch this symbolism was a profound study, and was not without its influence on the development of the Alexandrian school. It was closely connected with the Egyptian view of the moral order of the world, the immortality and transmigration of the soul, and retribution after death. The Osiris worship was elevated by the priests to a moral significance, and made an allegory of the struggles, sorrows, and self-recovery of the human spirit. It was connected moreover with a severe practical morality. This morality is set forth in a papyrus supposed to be nearly 4,000 years old, and written by one who calls himself the son of a king. Its practical philosophy is not unlike that of the Proverbs of Solomon. It glorifies wisdom, represents the bad man's life as a living death, and enforces its precepts by the consideration of the divine presence even with the solitary soul.—Hitherto philosophy had been in close alliance with mythology. In Greece that alliance, after giving an impulse and direction to speculation, was weakened or dissolved. Pre-Socratic philosophy had for its special problem an explanation of nature, independent of the poetic cosmogonies. Under the manifold phenomena of the physical universe it sought the first principle, the primitive ground of things. Of the physicists of the Ionic school, Thales (about 640–546 B. C.), Anaximander (differently classed by Lewes), and Anaximenes are the most noted. Thales, however, advanced formally but little beyond the Homeric cosmogony, which ascribed to Oceanus and Tethys the origin of all things, when he represented the beginning of things to be water. His explanation simply eliminated the mythical element. Anaximander of Miletus, sometimes spoken of as his disciple and sometimes as his contemporary, substituted for water (as *ἀρχή* or beginning of things) *τὸ ἄπειρον*, the unlimited, to which it is difficult to attach a definite significance, but which may be supposed to be a kind of primitive substance, with latent, commingled, but undeveloped forces. Anaximenes, who accepted this "unlimited," but made it the all-embracing, all-moving air, scarcely passed beyond the line of his predecessors, who limited themselves to the theory of a primitive substance out of which the universe was developed. Pythagoras of Samos (flourished 540–500 B. C.), founder of the school that bears his name, regarded the universe in its quantitative rather than its qualitative relations. He asked after the form and order, rather than the substance of things. The secret of his philosophy was in number, and in the One he found that which was most perfect. Proceeding from the One, identified with God, he found the universe a scheme of numerical proportions and harmonies, in his own language a *kosmos*. By numbers the quantitative relations of things are determined. Forms and proportion may be resolved into number. Much that Pythagoras taught is left obscure, and some things doubtless are credited to him which belong to his disciples. His philosophy, in its ethical and religious aspects, shows a marked advance. His contrast of the paths and results of virtue and vice has become memorable. He insisted upon a pure and pious life, urged the duty of perfect submission in all things to the will of God, and made a striving after the divine likeness the standard of duty. For his doctrines of the immortality and transmigration of the soul he is said to be indebted to Egyptian sources. The Eleatics exalted the One of Pythagoras into the All. They sought to apprehend pure being, changeless and independent of the forms and conditions of time and space. According to Xenophanes, a younger contemporary of Pythagoras, the one is all, and the all one. God is the universal supreme intelligence, and the mythological extravagances of the poets and the anthropomorphism of the popular religion are by him sharply denounced. Parmenides embodied his philosophy in an epic poem, in which he sets forth his notion of being, contrasting it with all that is changeful and phenomenal. It is pure thought, and thought and being are identical. Yet in the realm of the phenomenal change prevails, and opposite forces, like heat and cold, come in conflict, but meet in unity when body and soul are combined in man. Zeno of Elea, a disciple of Parmenides, developed the paradoxes of his predecessor, seeking to expose the contradictions in which the ordinary beliefs in a phenomenal world become entangled. He thus earned the title of originator of dialectic. Pushing his antithesis of being and non-being to an extreme, he develops from the One of Xenophanes an ill-concealed dualism. Heraclitus (about 513 B. C.) sought a principle of reconciliation in the idea of becoming, the bridge from being to non-being, from the one to the many. The totality of things is in perpetual flux, and their permanence is illusive. All comes and goes. Out of all comes forth all, life from death, and death from life. The circling alternation of birth and decay is incessant. Unity presupposes duality, harmony discord, and "strife is the father of all things." Heat is the all-vivifying, all-transforming element; it seems to combine in itself the properties of matter and force. The world from time to time resolves itself into the primeval fire. The soul is fire-vapor, in its perfection freed from the grosser elements. The practical bearing of his philosophy was to emphasize search for the true, and acquiescence in the fixed order of things.—At the head of the later natural philosophers stand Empedocles (born about 500 B. C.) and Anaxagoras, nearly his contemporary. The former differed from Heraclitus in adding necessity as a third principle, along with love and hate, to explain existing phenomena. He superseded the hylozoism of the earlier philosophers by the severance of the moving cause from matter. Anaxagoras gave a more definite shaping to this theory. He assumed, as ultimate elements, an unlimited number of primitive substances, or "seeds of things," the chaotic mixture of which was reduced to order by the intelligent principle, the νοῦς, or divine reason.—The most noted atomists were Leucippus and Democritus. The former asserted the existence of space-filling matter, by the division of which we reach the atom, the element of what is real and invariable. Round atoms possess the property of motion, and as they unite or separate all originates or dissolves. Democritus, about 40 years the junior of Anaxagoras, deriving the worlds from the multiplicity of atoms, explained sensuous perception by the efflux of atoms from things perceived. Thus images are produced, not always veracious, and ever to be distinguished from genuine knowledge. The soul, he taught, is the noblest part of man, and happiness, which consists in an equality of temperament, is to be obtained through justice and culture.—In the sophists we note a transition in the sphere of philosophy from nature to man. Protagoras, applying the doctrine of Heraclitus to the knowing subject, made man the measure of all things, as well of what is not as of what is. All truth is consequently relative. Of the existence of the gods there can be no certainty. Gorgias taught that nothing exists; or if it existed, it could not be known; or if existing and knowable, the knowledge of it could not be communicated. Hippias pretended to universal knowledge. Some later sophists identified right with interest, made instinct, caprice, or force the principle of obligation, denied moral distinctions, and justified the severest criticisms of Socrates. The latter, by elevating the practical over the speculative, by giving the νοῦς of Anaxagoras a moral significance, by asserting moral and religious obligation, turned philosophy into a new channel. He emphasized knowledge or moral insight, either identifying virtue with it, or making it dependent on it.—Two tendencies, the ethical and the dialectic, were developed from the Socratic principle of knowledge as related to virtue. The first of these was represented by the cynic school of Antisthenes and the Cyrenaic school of Aristippus; the other by the Megaric of Euclid and the Elean of Phædo. In the cynics we have the foreshadowing of stoicism, and in the Cyrenaics the predecessors of the Epicureans. Euclid gave a new edition of the Eleatic doctrine, and is supposed to have modified Plato's views. Phædo was one of the most genuine disciples of Socrates, but he was less gifted than that master's favorite pupil Plato, the ablest expounder of his doctrines, which he modified and enriched with his own illustrations. His philosophy deals with dialectics, physics, and ethics. To the first of these the Platonic theory of ideas is fundamental. The idea was the spaceless, timeless archetype of individuals. It is the universal, the real and eternal, existing *per se;* the unity underlying all phenomena of the same class. The highest idea is that of the good, which is represented as the originating cause of being and cognition. In physics Plato held that matter is eternal, originally chaotic and formless, but along with this is the ideal world. The cosmos was produced by the best artificer, the moving deliberative principle, after an eternal pattern. Plato's explanation of nature, in contrast with the earlier ones, is thoroughly teleological. The human soul, kindred to the world-soul, which mediates ideas, and is the invisible dynamical principle of order and motion, is a dualism of forces, the one culminating in the pure thought of reason, the other impulsive and gravitating downward, thus attesting man's apostasy from his preëxistent state. Of this state, by a pure and reasonable life, he awakens reminiscences, and by it also he may hope to escape the evil, and attain to the blessedness of those whose lives please God. Plato's life is marked by three stages of philosophical progress. To the last belongs his founding of the Academy, and the application of his principles to nature and the state. His philosophy, when not identified with dialectic, as it sometimes is, is reached by it; for this discriminates; it teaches to divide and to combine; and beneath the tangible and visible, which are but shadows of the reality, it searches out the true and real. By dialectic the soul attains to true knowledge; it is emancipated from its bondage to body and to sense, and restored to its preëxistent perfection.—While Plato esteemed only abstract types, Aristotle laid stress on concrete individualities, assailed the theory of ideas as baseless and fantastic, and proposed instead the theory of causes. He recognized four metaphysical causes or principles, matter, form, motive power, and end, which all resolve themselves into the fundamental antithesis of matter and form. The form, which is life, being added to matter, to which also is ascribed an element of desire, transforms potentiality into actuality; thus a statue results from matter in the quarry and form in the mind of the artist, and nature is but an evolution of the forms of divine intelligence. These forms, unlike the Platonic ideas, are not accomplished, self-subsistent, and permanent entities, but constitute at once an eternal energy or entelechy and its eternal product. The actual does not follow, but coincides with the potential; the form or essence of nature is nothing else than the way to nature, its realizing activity and also its proper end. The ideal and real elements which Plato had set apart were thus closely bound together. Forms, as motive principles pervading the universe, have their source in God the first mover, who is being in perfect activity, and bears nothing in himself which is merely potential. As Platonism culminated in the conception of ideas, Aristotelianism culminated in that of motion, energy, or life, working in all things, and the ground of their existence and development. Reality belongs only to particulars; complete knowledge requires complete experience; but all possible determinations of being are contained in ten categories, their relation to which may be discovered by syllogistic reasoning. The Aristotelian system of logic was scarcely improved until the present century. The systems of Plato and Aristotle (often designated respectively as the academic and the peripatetic philosophy) are illustrious examples of the ideal and real, or *a priori* and *a posteriori* schools, which have existed in every age of speculation.—The decline of the Greek spirit and civilization was marked by three systems of philosophy, conceived with indifference to speculative truth. The skepticism of Pyrrho denied the possibility of certitude concerning anything objective, and proposed a thoughtless and aimless acquiescence in the impulses of nature as the law of life. His system was maintained by the leaders of the new academy, Arcesilaus and Carneades, and anticipated the absolute doubt of Ænesidemus and Sextus Empiricus. Epicurus proposed as the goal of philosophy a scheme of morals that should inevitably lead to happiness. The aim of his physics was to rid mankind of the terrors that come from belief in God and immortality, and the aim of his logic was to banish the troubles that come from error. The universe is an aggregation of atoms, moving by chance; the soul terminates with death; and in a remote space the gods lead a changeless, careless life, ignoring all management of things. Plutarch reproached this system with total sterility of great men and great actions. Stoicism, on the contrary, was recommended by its heroes. Founded by Zeno, a native of Cyprus, and developed by Cleanthes and Chrysippus, it sought to establish a discipline of virtue in an age of degeneracy. Assuming that all the materials of knowledge are furnished by sense, it maintained that assent or the free exercise of reason is also required to constitute opinion, and thus proposed a subjective criterion of truth. Nature is composed of passive matter and active ruling reason, and to live harmoniously with nature or conformably to reason is the moral law. Intellectual or rational existence is thus alone recognized; passions, pleasures, and pains are to be ignored and despised.—The Romans, to whom the results of the Greek schools were made known by Cicero, originated nothing in the progress of philosophy. Epicureanism was represented among them by Lucretius, and stoicism by Seneca, Epictetus, and Marcus Aurelius, but neither acquired new speculative elements; the former inspired the lower, and the latter, which was an anticipation of the national genius, inspired the higher qualities of Roman life. Seeking only a rule of conduct and government, excelling only in the arts of legislation, the Romans aimed to apply rather than discover principles, and borrowed the ideas not only of Greece, but also, through the Ptolemies and Seleucidæ, of Egypt and Asia.—The Alexandrian school originated in the collision of Christian, Jewish, and pagan thought. Its problem, suggested by Philo Judæus, and by oriental dualism, which ascribed evil to matter, was to mediate between the infinite and the finite, the perfection of God and the imperfection of creation. Hence the Gnostic scheme of emanations, which interposed successive intermediate ranks of being, a demiurge, or world-builder, and countless æons. This scheme was almost infinitely varied. Analogous to it was the speculation of the Neo-Platonists, whose aim was a philosophical monism that should put an end to the dualism of subjectivity and objectivity. They borrowed freely from Plato, and to some extent from Aristotle; but their hope and effort to obtain absolute truth was based, not on the methods of objective knowledge, or any dialectic process, but on an inner mystic subjective exaltation, which amounted to immediate vision or ecstasy. Plotinus, the chief thinker of the school, was at once a Platonist and a mystic. His pantheism harmonized with his theory of the possibility of attaining to that vision of the eternal reason, or universal soul, which he claims repeatedly to have enjoyed. Porphyry and Iamblichus were his successors, combining their philosophy with theurgy and applying it to the defence of pagan ritual. Proclus, in whose time the school had been removed to Athens, was more a pagan hierophant and mystic than a philosopher. Before the decree of Justinian (A. D. 529) forcibly suppressed Neo-Platonic speculation, it had run its course, and demonstrated its lack of the elements of permanent vitality. The power of Julian and the genius of Hypatia could only temporarily arrest its decay.—Scholasticism was the result of a variety of coöperative elements, which united to mould the philosophy that bears this name. The early Christian fathers, with the exception of Justin Martyr, Clement of Alexandria, and Origen, repelled rather than courted the alliance of philosophy. Some, like Tertullian, were violent in its rejection. But the defence of dogma, especially against Arius, taught them the necessity of a more subtle logic. Augustine was inclined to Platonism, in accordance with which he systematized or defended Christian doctrine. Aristotle commanded increased respect, and Boëthius was regarded as an authority. Yet for centuries philosophy existed scarcely in name. Except among the Saracens and Jews, it experienced no marked revival till the rise of scholasticism. This was the adaptation of eclectic principles to the conditions of dogma that had crystallized to a fixed form under the influence of tradition and authority. At first its aim was to elucidate and vindicate doctrine, then to harmonize speculation with faith, and finally, by the aid of reason, to suppress the opposition of reason to dogmas too inviolable to be questioned. In doing this, it broke with the spirit of the age, and fell under its assaults. Its first period dates from John Scotus Erigena (died about 880), who translated the Pseudo-Dionysius, through him imbibed Neo-Platonic views, and pronounced philosophy the science of the principles of all things, and inseparable from religion. In his system are found the germs of mediæval mysticism and dialectic scholasticism. Although disapproved by the leading authorities of the church, he found adherents, and furnished a point of departure for that conflict between nominalism and realism which thenceforth runs through the whole history of the scholastic philosophy. A realist himself, he could invoke Platonism in his defence; but he thereby provoked his opponents to exalt the exclusive authority of Aristotle. The doctrine ascribed to Plato, and involved in his theory of ideas, that universals have an existence anterior to individual objects (*Universalia ante rem*), was the ground of conflict between the two parties. Nominalism contended that only individuals have real existence; that universal notions are mere names, conceptions without reality. They denied genera and species apart from the concrete individual. Their motto was, *Universalia post rem*, and they appealed to Aristotle as authority. The disputes of the time prepared the way for a more careful study of the works of the Stagirite, soon to be supplied from Arabian sources. Meanwhile speculation took its course, and philosophical antagonisms became more pronounced. Anselm (died in 1109) planned a system of philosophy mainly accordant with that of Augustine. While harmonizing religion with reason, fixed religious convictions were presupposed. By some he has been regarded as the inventor of scholastic metaphysics, while others have given the preference to Abélard, and still others have pronounced Alexander of Hales the first schoolman. It was when William of Champeaux had become the champion of the realists, and nominalism (under Roscellinus, on account of his free speculations on the Trinity) was falling into disrepute, that the latter was reënforced by a new impulse from an unexpected quarter. Aristotle, through the channel of Arabian learning, shaped the philosophy of Christendom. Through the Nestorian and Syrian Christians Arabian scholars had become acquainted with the writings of Aristotle. The patronage of the caliphs encouraged their translation and study. A philosophy was developed, which was a form of Aristotelianism, tempered with Neo-Platonic conceptions. Its most distinguished representatives were, in the East, Alkindi, Alfarabius (died about 950) with his doctrine of emanations, Avicenna, a stricter Aristotelian, noted for his physical speculations, and Algazzali; while in the West were Avempace, Abubacer (Ibn Tophail), and Averroes, the celebrated commentator on Aristotle, pantheistic in speculation, and rejecting the notion of individual immortality. Mystical tendencies were combined with philosophic speculation, and Ibn Tophail of Cordova anticipates Rousseau in his sketch of the "man of nature," self-developed, and rising by degrees of contemplation to union with the Deity.

Through the close connection of the Jews and Moors in Spain, Jewish and Arabic philosophy were at some points correlated. The Jewish Cabala was a system of emanations, reflecting the influence of Plato and Aristotle, making the idea of God transcendent, and exalting him above space and time. Avicebron (Solomon ben Gabirol) wrote (1059) under Neo-Platonic sympathies. A reaction favorable to Aristotle followed, and the attempt was made to reconcile his philosophy with Jewish theology. Moses Maimonides (1135–1204), a pupil of Averroes, ascribed to Aristotle unconditional authority in science. Levi ben Gerson distinguished himself as a commentator on Averroes; and when Arabian philosophy was proscribed by Mohammedan rulers, it found an asylum among Spanish Jews. By their translations, the Aristotelian philosophy was more fully brought to the knowledge of the scholastics. This better acquaintance with Aristotle contributed to the ascendancy of nominalism. His philosophy was applied to natural theology, and its theistic character favored its spread. But its ascendancy was not secured without a conflict. Albertus Magnus (died in 1280) first shaped scholasticism in harmony with the Aristotelian system. Blending Neo-Platonist notions with those of Aristotle, he originated disputes on matter and form, essence and being. Thomas Aquinas (died in 1274), the greatest thinker of his age, followed Augustine on some points, and anticipated Leibnitz on others. Like his great opponent Duns Scotus (died in 1308), the founder of the Scotists, he was a realist, blending Platonism with his Aristotelian philosophy. Scotus asserted that the universal is contained in the individual, that it is not created by the understanding, but communicated to it; while in theology he sought to fortify the cosmological proof of the existence of God. He excluded philosophy from the sphere of dogma, thus going beyond Aquinas, who denied that the non-eternity of the world was demonstrable on philosophical grounds. William of Occam (died in 1347), without constructing a positive system, was the powerful assailant of realism, denying its fundamental doctrine, or that ideas can exist except in the understanding, and, while refuting at length the theory of objective images, unintentionally perhaps gave an impulse to empiricism and skepticism. His opponents were numerous, but nominalism, under Gerson and D'Ailly, held its ground at Paris; and when the French theologians returned from the council of Constance, they boasted that in the sentence of Huss their philosophy had triumphed over realism. But dissatisfaction with the dubious results of speculation had encouraged mystical tendencies. John Bonaventura had set an example which was followed by the illustrious Gerson. Scholasticism was weakened by its internal discords and the secession of the mystics. Its dictatorial tone provoked opposition; the philologists of the renaissance attacked it; the reformers did not spare it; the revival of the Platonic philosophy in Italy contributed to its discomfiture; the mathematicians and natural philosophers openly broke with it; and bold and sometimes rash speculators, like Paracelsus, Cardan, and Pomponatius, undermined the old philosophical strongholds. Although the credit of Aristotle was maintained by Melanchthon (in his riper years) and Camerarius, and commanded respect in England as well as on the continent, far on into the 17th century, it was already on the wane. He was opposed by Telesius, refuted by Patrizzi, rejected by Bruno, who in some of his theories of God and nature anticipated Spinoza, and confronted also by the skepticism of an age that found its expositors in Montaigne and Charron.—The 16th century stimulated thought, but gave to philosophy no systematic development. Science made great progress, and daring speculators were not wanting. But in the early part of the 17th century the foundations of two systems, the objective and subjective, or empiricism and idealism, were laid by Bacon and Descartes. Bacon's attention was strongly attracted to physical science. He rejected the mysteries of alchemy, and all the *a priori* assumptions which anticipated the conclusions of science. These conclusions, he held, must be reached, not by Aristotelian logic or submission to the dicta of speculatists, but by a careful investigation and comparison of phenomena. This method is induction, the key to natural philosophy, and the only proper method to extend the solid foundations of knowledge. Nature must be interpreted, not anticipated, and anterior to experience there is no place for hypothesis. In this empiricism was the skeptical element of the Baconian philosophy, of which Hobbes made effective use in his manifold ethical and metaphysical speculations. The result was a materialism which derived all knowledge from sense; and although sharply attacked by the Cambridge Platonists, More and Cudworth, it did not fail to leave its impress upon the philosophy of Locke. Bacon had excluded from the field of investigation preconceived notions which might put a false interpretation on the facts of nature. Locke, rejecting the theory of innate ideas, made the mind a *tabula rasa*, but capable of reflecting upon the impressions received through the sense. Of outward things it knows only the qualities that impress the sense, not the nature or the substance of the things. Upon the knowledge thus acquired the mind operates, and all its knowledge is from the two sources of sensation and reflection. In Italy Campanella, a half century before Locke, had more than anticipated him in making sensation the source of knowledge. He resolved into sensation all the operations of the mind. Two years (1637) before his death appeared the *Discours de la méthode* of Descartes, the text book which laid the foundations of modern idealism. Like Campanella, he had passed through an experience of skepticism, but he was not satisfied to overcome doubt by the testimony of the senses. His object was to constitute philosophy a demonstrable science. To this end he begins with doubt. He admits the illusory nature of the phenomenal. The basis of valid knowledge is that consciousness which gives evidence of the ego and the non-ego, spirit and matter, subject and object: *Cogito, ergo sum.* His theistic argument has already been cited. He made clearness and distinctness the criteria of true thought. As the certainty of the self-conscious spirit was the foundation of his philosophy, the superiority of mind to matter and the peculiar idealism of his system was the necessary result. By his doctrine of *assistentia* he accounts for the communion between soul and body. Fatal as the speculations of Descartes were to the lingering authority of scholasticism, they were weakened by their connection with groundless scientific theories. Pascal and Huet gave evidence of more sympathy with his original doubt than his philosophical assurance. Gassendi was one of his opponents, and Geulincx and Malebranche materially modified his system. Malebranche, followed to some extent by John Norris of Bemerton, indulged in mystic tendencies, making knowledge the result of the union of the soul with God, or of a constant divine indwelling by which divine ideas are made apprehensible to us. The most pregnant apophthegm of his philosophy was, We see all things in God.—The theory of Descartes supplied Spinoza with a scientific form for his system. From the postulates of substance and causality, he deduces his conclusions after the mathematical method. His postulate of substance is that of one absolute essence, an infinite being, with infinite attributes of extension and thought. In this unity the dualism of mind and matter is swallowed up. Finite beings are only modes of the infinite attributes. All exist in the Deity, their inherent cause, *natura naturans*, and all necessarily proceed therefrom. Here is the base of Spinoza's imposing pantheism and universal necessity. Leibnitz, a universal scholar and an acute critic, reached his ideal standpoint by spiritualizing matter, and increasing to infinitude the number of substances. He identifies matter with active force, and in his universe composed of "monads" bestows perception, more or less distinct, upon every atom, each of which in its own way represents and reflects the universe. To meet the objection that each monad has its own law, and that it is impracticable to combine it with another, as soul with body, over which it can have no control, he devised his doctrine of preëstablished harmony. God is the *monas primitiva*, from whom all finite monads are derived; and besides these and phenomena, which are perceptions of monads, nothing exists. In contending for certain necessary truths, not mathematical but metaphysical, which must be sought in the soul itself, and not certified by experiment, Leibnitz prepared the way for the categories of Kant. Wolf rejected indeed his notions of monads and preëstablished harmony, retaining his optimism and determinism, and sketching out for the first time a complete encyclopædia of the philosophical sciences.—In Germany and France the influence of Locke was powerfully felt. In the latter country Condillac reduced Locke's two sources of knowledge to sensation alone, and in transformed sensations explained all the high attainments of human intelligence developed in his ideal statue. His system fell in with the French reaction of his time, and was in sympathy with the theory of self-love advanced by Helvétius, the moralist of sensationalism. Another stage of progress was reached in the materialistic atheism of La Mettrie and D'Holbach. To this result the writings of Hume had contributed, but in England and Scotland the philosophy of Locke had not been subjected altogether to an exclusively sensualistic interpretation. In rejecting innate ideas, and positing qualities, as color and sound, in the perceiving subject, he prepared the way for Berkeley to assert that only minds and their ideas exist, and that the permanence of ideas is the proof of an Eternal Mind to which they are uninterruptedly present. But this position, in connection with Locke's sensationalism and empiricism, gave occasion to the skeptical philosophy of Hume, who applied the principles thus evolved, denying the possibility of knowing the nature and mode of the objective connection between cause and effect, and thus disputing the philosophical legitimacy of the attempt to transcend by means of the causal idea the field of experience, or thus conclude the existence of God and the immortality of the soul. This skepticism, destructive not only of speculative philosophy, but of the foundations of all real knowledge, was combated in Scotland by Reid, who sought to establish against it his "philosophy of common sense," in which he rejected representative ideas; while in Germany it stimulated Kant to an examination of the foundations and conditions of human knowledge. Educated in the school of Wolf, but sympathizing more with Descartes than with Leibnitz, he produced his "Critique of Pure Reason," in which he assumes that our first step must be to scrutinize the processes of the mind, and thus determine, not what is the nature of things, but what can man know. All cognition is the product of two factors, the cognizing subject and the cognized object. One of these contributes the matter, the other gives it form. Perceptions without notions are blind, and notions without perceptions are void. Yet we do not know things as they are in themselves, but in their perceptions, while the forms native to the mind, the categories on which thought is conditioned, add to the given manifold of perception, and to us modify the objects. Thus criticism sets insurmountable bounds to the speculative reason, and might seem to favor an absolute skepticism. But against this result Kant guards in his "Critique of Practical Reason," where he begins with moral principles, and from the moral law, attested by conscience, conducts us to God, the source and author of the law, without whom the law could not exist. Here is the ground of the certainty of a rational faith. Jacobi objected to Kant that his philosophy destroyed itself by an intrinsic contradiction, since to come to the "critique" of reason, one must first have a causal nexus, uniting the thinking subject and its object. Reinhold at first found this in consciousness, but Jacobi, averse to dogmatical theories which admitted no truth without demonstration, and which led logically to determinism and pantheism, sought to avoid the difficulty by founding all philosophical knowledge on belief, which he describes as an instinct of reason. The external world is revealed to us by the senses, and things imperceptible, as spiritual truths, by an internal sense; and by this twofold revelation man is awakened to consciousness and a sense of free will. Schleiermacher followed Kant only to a limited extent, and, as a student of Plato and Spinoza, as well as of contemporary thinkers, was rather a critic of the systems of others than the author of one of his own. His position, while not without deep philosophical significance, was more important in the religious sphere. Fries, following Jacobi's line of thought, developed the doctrine that the sensible is the object of knowledge, the supra-sensible the object of faith. He held also that only *a posteriori*, or through internal experience, can we become conscious that, and how, we possess cognitions *a priori*. Fichte, adopting some of Kant's peculiar opinions, pushed to an extreme their subjective idealistic tendency. The Ego was made to take the place of the absolute principle. The matter of representations, as well as the form, was the result of its activity, and the manifold contents of experience, like the *a priori* forms of cognition, are produced by a creative faculty in us. The Ego posits both itself and the non-Ego, and recognizes itself as one with the latter. But with these results of his speculative philosophy Fichte connects the positive conclusions of his practical philosophy. The individual is deduced from the absolute Ego, for morality demands the distinction of individuals; yet the rise of the limits of the individual is pronounced incomprehensible. The world is the material of duty in the forms of sense, and God is identified with the order of the world. In his later speculations Fichte, making the absolute his point of departure, approximated to the position more distinctly taken by Schelling. The latter transformed Fichte's doctrine of the Ego, accepted by him, through combination with Spinozism, into the doctrine of identity. He made subject and object, ideal and real, spirit and nature, identical in the absolute. He designated as the soul of the world a vital principle residing in nature, and uniting all inorganic and organic existences in one complete organism. By successively incorporating into his system various elements, he developed a syncretistic doctrine approximating to mysticism. Rejecting these elements, yet in agreement with the original position of Schelling, Hegel held that it is not anything individual, not the Ego, that is the *prius* of all reality, but, on the contrary, something universal which comprehends in it every individual, and in which the principle of difference is immanent. Finite things are not simply phenomena for us, existing only in consciousness, but phenomena *per se*, having the ground of their being not in themselves, but in the universal divine idea. This idea, the absolute, is the unity of life and cognition, the universal that thinks itself, and thinkingly realizes itself in an infinite actuality. It reveals itself in nature and spirit, not only underlying both as their substance, but as rational subject returning through them, by means of a progressive development from the lowest to the highest stages, from its state of self-alienation to itself. Its self-development is threefold: 1, in the abstract element of thought; 2, in nature; 3, in spirit—following the order of thesis, antithesis, synthesis. The aim of Hegel's philosophy is, first to elevate consciousness to the point of absolute knowledge, and then to develop the entire contents of this knowledge by means of the dialectical method. Herbart took his point of departure, not from Kant, but from Fichte, to whose subjective idealism he opposed the fundamental doctrine of the plurality of simple real essences, somewhat akin to the monadological doctrine of Leibnitz. This, from its predominant character, he named realism. His logic agrees in principle with Kant's. Conceptions must be modified or transformed, so that they shall not contradict being, and this is the proper work of speculation. But this necessity requires us to admit the doctrine of a multiplicity of essences. Beneke (died about 1854), opposing Hegel and Herbart, and following Kant, emphasized internal experience. His guiding thought is, that through self-consciousness we know ourselves psychically as we are, but are able only imperfectly to know the external world through the senses, its true nature being apprehensible only as we suppose analogies of our psychical life to underlie the phenomena of the world of sense. Schopenhauer (died in 1860) taught, with Kant, that space, time, and the categories have a purely subjective origin, valid only for phenomena which are merely subjective representations in consciousness. He denies, however, that the real is unknowable, and finds it in will, taken in a broad sense, so that it includes not only conscious desire, but also unconscious instinct, and the forces which manifest themselves in inorganic nature. The absolutely real cannot be termed a transcendental object, since each object has its corresponding subject, and all objects are simply representations in the subject, and hence phenomena. Weakened by internal contradictions, Schopenhauer's system is most noted for its development of pessimism, in which the results of his subjective experience have been supposed to be reflected. Trendelenburg (died in 1872) represents the new phase of German philosophy resulting from the reaction which followed the growing distrust of the absolute idealism of Hegel. He could accept no speculative principle from which the sciences could be developed dialectically, by an *a priori* process. Hegel's "pure thought," without content, was impossible. To become a starting point at all, it must subsume *a posteriori* conceptions. The fancied demonstration of the identity of thought and being was unsound. From these (each of them nothing or repose) becoming, or motion, is assumed to be derived. But in this space and time are involved, yet it is successively assumed in Hegel's designation of the steps in the progress of pure thought. External motion is thus the postulate of a logic that would postulate nothing. With Kant also Trendelenburg joins issue, claiming, against his assumption, that time and space are not merely subjective, but objective and subjective at the same time. In the neglect of the history of philosophy, Trendelenburg found one explanation of the unsoundness of the views he opposed. With Plato he made philosophy the sentinel over the bounds of the sciences, developing their underlying unity. The existence of a real objective world does not need to be proved. It is the grounds of our belief in this reality that belong to philosophy. Now in cognition the antithesis of thought and being is involved. The principle that shall mediate between these must be one common to both. It must be active, primitive, simple. Let motion be hypothetically assumed as such principle. On examination, it meets the conditions required. It may be regarded as the *prius* of experience. From it result eight categories, the first of which is causality. If motion is the first energy of thought and being, the resulting categories express relations at once objective and subjective. The chasm between the real and the ideal is bridged over. The notion of purpose, for Trendelenburg the second fundamental notion in philosophy, enables him to pass from the physical into the organic and ethical realm. Thought takes motion into its service. The final cause controls the efficient cause in identifying itself with it. The inadequacy of the efficient is the indirect proof of the designing cause. From these principles Trendelenburg develops his ethical and theistic doctrines. Ulrici (born in 1806), one of the most eminent of living German philosophers, aims to construct a philosophy of idealism on a realistic basis. His object is almost identical with Kant's. He agrees with Trendelenburg in pronouncing a delusion the pretension of Hegel that his philosophy assumed nothing. There are certain laws that control every mental operation, and to these the skeptic as well as the dogmatist is subject. Nothing can be known except as differentiated from something else. Hence all knowledge is relative. There are certain modes in which we must differentiate things, and these are the logical categories. These are the *a priori* conditions of knowledge, and are implicitly given in the nature of the mind itself. The notion of the absolute implies them, and hence cannot be the starting point of philosophy. In like manner, the experience philosophy that would trace everything back in sensation is seen to be untenable. But the modes of conception to which we are compelled by the laws of thought have not a merely subjective validity. There is an external world, forcing itself upon us through the senses, the existence of which no idealist can deny. External objects exist, and when we study them scientifically we are forced to differentiate and classify them according to the logical categories. We find laws of thought, which are also laws of things, and yet neither derived from the other. Nature's methods are rational, and nature is intelligible only as the work of a rational mind. By this line of thought, Ulrici seeks to confute at once sensational philosophy, atheism, and pantheism, and to establish the connection between the objective reality and the cognizing mind. E. von Hartmann (born in 1840) has recently made a step in a new direction. He attempts to reach speculative results by inductions from physical science. He examines the phenomena of the unconscious, appearing in the actions of the body and soul of man, plants, and animals, and, taking the sum of the individual instances as the one principle underlying all, he designates by the term of "the unconscious" what Spinoza calls the sole substance of all things, Hegel the idea, and Schopenhauer the will. He employs the term only provisionally and temporarily, understanding the unconscious to be: 1, that which forms and maintains organisms, repairs their external and internal injuries, adapts their movements, and places them at the disposal of the conscious will; 2, that which in the instinct is needed for the preservation of a being, and for which conscious thought is insufficient; 3, that which preserves the species through sexual and maternal love, perfects them through selection in sexual love, and leads mankind to the goal of the highest possible perfection; 4, that which determines the actions of man through apprehensions and sentiments wherever he is not able to make a choice by conscious thought; 5, that which assists the process of conscious thought through intuitions, and which in mysticism aids man toward the apprehension of higher and supersensual unities; 6, that which blesses man with the sentiment for the beautiful and for artistic production.—French philosophy, during the closing part of the last century, was completely under the influence of the school of Condillac. Metaphysics was regarded as nothing but the analysis of sensations. As these might be considered with reference either to the organs of sensation or to the mind, the school was divided into two branches, one represented by Cabanis, so thorough a materialist that he pronounced thought a secretion of the brain, and the other by Destutt de Tracy, who sought to derive from the experience of volition notions not given in sensation. A reaction followed, in part theological, represented by Bonald, Lamennais, and De Maistre, and in part psychological, represented by Maine de Biran and Royer-Collard. Lamennais followed Pascal in emphasizing the illusions of sense and the weakness of reason, to find in universal consent a better basis for religious certitude; while De Maistre, the founder of modern ultramontanism, framed a philosophy of history in harmony with his creed. Maine de Biran objected to the sensationalists, that they formed their notions of internal after the analogy of external causes. Royer-Collard introduced into France the Scotch philosophy, especially insisting upon Reid's distinctions and principles. His most distinguished disciple was Victor Cousin (1792–1867), who originated the eclectic school, designed to occupy a middle place between the German and the Scotch philosophy. For a time attracted strongly by German idealism, and approximating to pantheistic views, his later course, especially after his historical studies, was more in the line of the Scotch philosophy. In close sympathy with him, as the most celebrated of his disciples, was Théodore Jouffroy (1796–1842), really his superior in a spirit of method and precision, who from his psychological standpoint, which he never deserted, extended his speculations into æsthetics and moral philosophy. The peculiar circumstances of French social life meanwhile drew large attention to questions of social philosophy, in connection with which the elements of human nature, including the passions and affections, were studied, and the relations of individualism to social order were investigated. In this sphere Saint-Simon, Fourier, Leroux, and some writers on questions of political economy, have won distinction. Auguste Comte (1798–1857) is known as the founder of the positivist school, the fundamental doctrine of which is the denial of all metaphysics, and the limitation of positive knowledge by the exclusion of all assertion of first or final causes. Allied to this is the position of the three states, theological, metaphysical, and positive, through which the individual mind and the human race alike must pass in their progressive development. Of recent French writers on different branches of philosophy may be mentioned Bouillier, the historian of Cartesianism; Paul Janet, a critic of Büchner's materialism; Jules Simon; Damiron; T. H. Martin; E. Vacherot, author of numerous philosophical works, among them a "Dictionary of Philosophical Sciences;" and E. Saisset, whose edition of Spinoza has taken its place as a classic in philosophical literature.—In Italy the name of Vico (1668–1744) is the most illustrious among the philosophical thinkers of the 18th century. His *Scienza nuova* produced a deep impression beyond the bounds of his own country. In the comprehensiveness of his survey of the philosophy of history, he embraced all science and all elements of human progress. He has been pronounced "the founder of the philosophy of history, and of the psychology of races or nations." In more recent times philosophical development has been influenced mainly by two diverse tendencies, that of Descartes and Malebranche (idealism) on one side, and that of Locke and Condillac (sensationalism) on the other. With the revival of national aspirations, a native and more independent philosophy sprang up. The representative of empiricism was Melchiorre Gioja (1767–1829), a follower of Condillac in psychology, of Bacon in method, and of Bentham in morals. He was followed by Romagnosi, who however rejected the notion that ideas are but transformed sensations, and held that the harmony between the faculties of the mind and the forces of nature is the foundation of all philosophy. He opposed Rousseau's views of civil society, and maintained that right is subordinate to duty. Galuppi (1770–1846) sought to establish the validity of knowledge by the analysis of thought, directing his attention mainly to psychology, which, with ideology, he made to embrace all metaphysical science. Dividing philosophy into subjective and objective, he inclined to Kant rather than to Locke, and his views of duty and of theism were Kantian. Rosmini (1797–1855) was the founder of modern idealism in Italy. He rejects all the generally accepted solutions of the problem of knowledge, in part admitting Kant's views, but excepting to his extreme of subjective perception. He holds the primitive and necessary intuition to be the idea of possible being. To matter he concedes a primitive sensibility, holding with Campanella that chemical atoms are endowed with a principle of life, and with Bruno that a universal soul exists in nature, whose sphere is indefinite space. Creation is the result of that divine love which is the necessity of absolute being. It is God in its ideal essence, but not in its realization, which is finite. Mamiani (born in 1799) is an ontologist, holding immediate perception as the only foundation of the knowledge of reality. But combined with perception in the unity of mental action is intellection, which consists in the relation of the mind to ideas, which are intellectual symbols of the absolute reality, and in the divine mind are real objects. The existence of God is thus founded on the very nature of primitive intuition, and its demonstration *a priori* is a simple process of induction from the principle of identity. Combined with these views is Mamiani's elaborate scheme of cosmology. To the ontological school also belongs Gioberti (1801–'52). He dissented radically from Rosmini, to whom he bears somewhat of the relation of Plato to Aristotle. He commends the sobriety of English and Scotch philosophy, but recognizes no true modern philosophers after Malebranche and Leibnitz. While the starting point of Rosmini's speculations is psychological, that of Gioberti is ontological. He begins with the idea, asserting that we see directly and immediately the ideal being, which can be no modification or subjective form of the human spirit; and this ideal being we regard as identical with absolute being. Only as this is made objectively real can we fully conquer sensism, nominalism, and skepticism. Plato's ideas are but abstractions unless they be concrete in the idea of the being. Revelation alone can assist us to decipher the grand enigmas of man and the universe, and avoid the extremes of pantheism or dualism. The philosophy of Scripture is founded upon a single axiom, expressible in one word, creation: "the Being creates existences." This, properly conceived, fully resolves the question of the origin of ideas. Insisting upon the intimate union of philosophy and religion, Gioberti exclaims: "I establish philosophy upon a formula as ancient as the creation." Augusta Vera (born about 1817) is the recognized head of the Hegelian school in Italy, to the exposition of the views of which he has devoted his pen. Ventura (1792–1861) was the representative of scholasticism, placing the authority of the church above reason and all else, and holding that philosophy culminated in Aquinas. Positivism, implying the negation of all metaphysical science, is represented by G. Ferrari, who makes experience the only foundation of true knowledge, and asserts that Hegel only produced a philosophy of contradictions, and that his failure shows the futility of all metaphysical speculation. Sympathizing with him are Franchi (whose real name is Francesco Bonavino) and others, who, asserting the relativity of knowledge, pronounce all questions as to the absolute and infinite insoluble, and limit philosophy to natural science.—In Belgium, Holland, Switzerland, the Scandinavian and Slavic countries, and Hungary, the various schools of German philosophy have exerted successively a not inconsiderable influence. At Ghent a modernized Cartesianism has been defended by Huet, a pupil at Paris of Dumoulin. In Louvain, Ubaghs, as a disciple of Bonald, taught a doctrine of supernatural ontologism, which was opposed by the Jesuits. In Holland the recent names most significant in the history of philosophy are Hemsterhuis, Wyttenbach, Van Heusde, and Opzoomer. In Norway, Hegelianism is represented by Monrad, and in Sweden the Kantian philosophy by Boëthius, and that of Fichte and Schelling by Höijer, while Boström follows Leibnitz, and Borelius, Hegel.—In England, the history of philosophy in the 18th century, after Berkeley, is illustrated by the speculations of Hume, already referred to; Andrew Baxter, who wrote in defence of the immateriality of the soul, asserting against Berkeley the reality of the external world, and also that it is neither eternal nor uncreated; David Hartley, who by his doctrine of vibrations prepared the way for the materialism of Priestley, and by his theory of association for the speculations of Adam Smith; Joseph Priestley, who maintained the doctrines of the materialism of the soul and philosophical necessity, in which he was sustained by Thomas Belsham, and opposed by Richard Price; Erasmus Darwin, who, holding the dualism of matter and spirit, derived ideas from physical impressions on the fibres which constitute the immediate organs of sense; and Abraham Tucker, who in the broad range of his speculations aimed to harmonize extreme views, and to be himself conservative, while sometimes giving a free scope to philosophical fancy, and discussing a great variety of topics theological and philosophical, including the relations of the spirit to matter, liberty, and necessity. In Scotland, Oswald, Beattie, and Campbell united with Reid in opposing and refuting the skeptical philosophy of Hume. At the commencement of the present century, Dugald Stewart modified Reid's technology, conceding more than he did to the laws of association, while approaching nearly to Hume's position in his estimate of the notion of causality. He was succeeded by Thomas Brown, who, following Reid and Stewart in the doctrine of original intuitions taking the place of unproved first principles in a system of knowledge, rejected their doctrine of consciousness, and, though agreeing with Hume in resolving cause into invariable antecedence and consequence, differed with him in ascribing our notion of it, not to mere custom, but to irresistible intuitive belief. In closer sympathy with Stewart was Sir James Mackintosh. More eminent than any of these was the late Sir William Hamilton, the annotator of Reid, whom he follows in asserting that consciousness makes us immediately cognizant of the non-Ego, at the same time maintaining the relativity of all knowledge, that the infinite and absolute are simply inconceivable, and that an uncaused and self-existent being can be only the object of faith. While a disciple of Hamilton, Mansel differed from him, as from Kant, on certain points of immediate knowledge, while he pushed Hamilton's principles beyond the point at which Hamilton had left them, contending that thought and knowledge are limited to conditioned and finite objects; that the unconditioned can be only negatively known; that while the "limits of religious thought" may be fixed, the sphere of faith transcends reason, and suffices to resolve difficulties which reason cannot overcome. From both Hamilton and Mansel Henry Calderwood dissents with respect to their theory of the knowledge of the infinite, making a positive theism the condition of our knowledge of the finite, and denying the opposition of faith to knowledge. James F. Ferrier, disclaiming idealism, adopted idealistic positions, asserting that the only material world which truly exists is one along with which intelligence also exists, so that the mere material would have no real and absolute existence; at the same time it is not a mere entity, since there is no non-entity, any more than entity, out of relation to intelligence. The associational psychology, which in some of its elements may be traced back to Hartley, received a new impulse from Thomas Brown. It was adopted in part by Alison, and more fully by James Mill, who confounded the doctrines of Hartley and Hume, making sensation a kind of feeling, and the idea its permanent residuum. By means of association, memory, voluntary states of mind and the moral sentiments are explained. John Stuart Mill extended this principle of inseparable association, announced by his father, to the solution of many philosophical problems, although admitting that it was inadequate to account for belief. The idea of causation is indispensable in analyzing our conceptions of matter and mind. The axioms of mathematical and physical science are the results of induction, and in other worlds, or to other minds than ours, might cease to be valid. Matter is defined as "a permanent possibility of sensation," and mind is resolved into "a series of feelings with a background of possibilities of feeling." The real existence of the external world cannot be philosophically proved. As to human freedom, the law of causality applies in the same strict sense to human actions as to other phenomena. Alexander Bain, in treating of the senses and the intellect, the emotions, will, &c., follows in the line of Hartley and James Mill, but makes use of the results of modern physiology, and applies them with much acuteness to mental phenomena. In his view of the close relations of matter and mind, he seems to approach the doctrine of their identity in a single substance. Herbert Spencer, like J. S. Mill, agreeing with Hamilton as to the relativity of knowledge, admits that by the necessities of finite and conditioned thinking we are compelled to assume an infinite and absolute, and also to form approximately definite notions of the same, although these notions must be progressively modified. The object of religious sentiment is, and will ever continue to be, the unknown source of things. The ethical sentiment in man is explained as the consolidated experience of generations, transmitted and accumulated. By his scheme of a general system of philosophy, in which he rivals the comprehensiveness of Comte, Spencer has commanded for his speculations the attention of both admirers and critics in England and this country. His starting point is the doctrine of evolution. Progress in organic development is from homogeneity to heterogeneity. Many of his conclusions are the results of this principle. As to matter and mind, they are sometimes presented as simple series of phenomena, and sometimes as permanently real, since persistence in consciousness supposes correspondence in permanent forces. Science and religion alike agree in assuming a permanent all-pervading force; but revealed religion or scientific theology is impossible, because, under the law of development or evolution, there must be endless modification in human conceptions of that force. Herbert Spencer's able French translator, Dr. E. Cazelles, sums up his philosophical method thus: "Starting from positive science, the different branches whereof he traces in their concentric progress up to their widest generalizations, he attaches these generalizations to the loftiest abstract conceptions that they all suggest, and brings them back together to the principle which officiates in the double capacity of supporting all the truths, and expressing an intuition of consciousness. He thus welds the most advanced results of experience to the legitimate and inevitable results of *a priori* speculation. Finally, by way of reduction, he derives from this first principle the laws which sum up the movement of things, and founds on an undeniable truth a theory of development which he afterward verifies by the different orders of knowledge, and by the history of the cosmos." As the predominant characteristic of Mr. Spencer's method is the coördination and synthesis of hitherto disunited branches of thought, he designates his system a synthetic philosophy. In regard to the great conflict between the intuitionalists and the experientialists regarding the origin of ideas, Mr. Spencer maintains that each school holds a partial truth. All knowledge is derived from experience, but all knowledge of the individual is by no means derived from his own experience. From this point of view of evolution the mental faculties are the products of the intercourse of the organism with its environment under the operation of the principle of heredity. The experiences of the race become organized and transmitted by inheritance, and thus have the effect of intuitions or *a priori* elements in the hereditary intellect and conscience of mankind. Among many recent English philosophical writers, the influence of Coleridge and of German and French philosophers, as well as of physiologists and scientists, may be distinctly traced. The course of speculation has been modified largely by the publications of Darwin, Huxley, and Tyndall. Antagonistic in tendency to these, in many points, are the writings of a considerable class of thinkers who were trained under the spiritualistic philosophy of Coleridge, and who belong rather to the sphere of literature than of philosophy. Some of these, however, are memorable as ethical or metaphysical thinkers. Whewell traced the history not only of the sciences but of moral philosophy in England; and Maurice, who like him rejected the philosophy of Paley, has written elaborately on ethics and metaphysics. The same may be said of Martineau, the leading representative of intuitive morality, which Lecky has ably defended. Recent philosophical development in England has thus been modified by influences quite diverse: some, represented by G. H. Lewes, physiological or scientific, coöperating to some extent with the positivism of Comte, or the speculations of Mill and Spencer; others spiritualistic or religious, and represented by men like Martineau and the duke of Argyll.—The first and greatest name in the history of philosophy in America is that of Jonathan Edwards. His views of the will, controversially presented in the interest of Calvinistic theology, although in a line with those of Leibnitz, closely approximated on some points to those of Anthony Collins. His theory of virtue, as love to universal being, was elaborated under the influence of Hutcheson and Turnbull. Eminent among his followers, though somewhat modifying his views, were Stephen West ("Essay on Moral Agency," 1772); Samuel Hopkins, noted for his doctrine of disinterested love; Nathanael Emmons, who made "the heart" a series of exercises of which God is the direct and efficient author (answered by Asa Burton, 1824, who argued for what is known as the "taste" scheme); and Jonathan Edwards the younger, who in answer to Samuel West published his essays on liberty and necessity. Enoch Pond and Samuel Spring are noted among the followers of Hopkins and Emmons, the latter of them engaging in controversy with David Tappan. One of the earliest opponents of Edwards in his views of the will was James Dana (1735–1812). Later critics of his theory, or advocates of counter theories, have been numerous, including H. P. Tappan (1839), Asa Mahan (1846), A. T. Bledsoe (1845), D. D. Whedon (1864), and R. G. Hazard (1864). In a line of thought mainly accordant with Edwards may be named Timothy Dwight, Jeremiah Day (who commented on Edwards and produced an original work on the will), and Charles Hodge. Nathanael W. Taylor and Charles G. Finney have written largely on moral government. Toward the close of the last century Locke's philosophy, in connection to some extent with French speculation, widely prevailed in this country. Early in the present century it was displaced by Stewart's "Disquisitions" and Brown's "Lectures," and from that time the Scottish philosophy, through the publications among others of T. C. Upham, has exerted great influence upon American thought. Up to that time the philosophical questions made most prominent concerned the freedom of the will, the nature of virtue, and the moral government of God. Upham's "Elements of Mental Philosophy" (1831), including the two departments of the intellect and the sensibilities, has been extensively used as a text book; he subsequently became the biographer and admirer of Mme. Guion. The writings of Coleridge have been brought to the notice of American readers by James Marsh and W. G. T. Shedd, and have exercised an important influence on American philosophy. President Marsh, while assailing the current philosophy of England and America, drew attention to what he proposed to substitute, the more profound spiritual philosophy of Coleridge, Kant, and Jacobi. At nearly the same time, following upon the influence of W. E. Channing, not himself a speculative thinker, but a bold and eloquent asserter of the rights of reason and conscience, what has been called the transcendental school of Boston sprang into being, the leading spirits of which were R. W. Emerson, Theodore Parker, Margaret Fuller, J. F. Clarke, and George Ripley; the last, in editing "Specimens of Foreign Standard Literature," rendered accessible select works of Cousin and Jouffroy. Identified also at first with this school was Orestes A. Brownson, who conducted a review devoted to the new speculations and containing original philosophical articles, mostly from his own pen, but who subsequently devoted himself to the discussion of the profoundest problem of ontology and psychology from the standpoint of the Roman Catholic church. C. S. Henry contributed editorially and critically to the dissemination of Cousin's views, some of whose works were translated by himself, Linberg, and Wight. More recently increased attention has been devoted to German and Scottish philosophy. James McCosh is a leading representative of the latter; he is to some extent a follower, but at the same time a critic of Hamilton, whose writings have been widely studied in this country. German thought has been made familiar by translations of German writers, and histories of philosophy by Schwegler (translated by J. H. Seelye) and Ueberweg (edited by H. B. Smith and Philip Schaff, and translated by George H. Morris, all of whom have made in critical articles independent contributions to philosophy). Special attention has been given to German speculation by "The Journal of Speculative Philosophy," conducted for the past eight years by W. T. Harris, himself a leading contributor and an eminent Hegelian. Among original American works on philosophy may be mentioned treatises on logic by W. D. Wilson (1856), Asa Mahan (1857), and H. N. Day (1867); and works on psychology by F. A. Rauch (1840), S. S. Schmucker (1842), Francis Bowen ("Essays on Speculative Philosophy," 1842), Joseph Haven ("Mental Philosophy," 1857), E. V. Gerhart ("Introduction to Philosophy and Logic," 1858), J. T. Champlin ("Text Book of Intellectual Philosophy," 1860), Noah Porter ("Human Intellect," 1868, and "Elements of Intellectual Science," 1871), Samuel Tyler ("Progress of Philosophy," 1868), John Bascom ("Elements of Psychology," 1869), O. S. Munsell ("Text Book in Psychology," 1871), James McCosh ("Intuitions of the Mind"), D. H.

Hamilton ("Autology," 1873), James Walker, editor of Reid's works and president of Harvard college, Laurens P. Hickok ("Rational Psychology," 1848; "Empirical Psychology," 1854; "Rational Cosmology," 1858; "Logic of Reason, Universal and Eternal," 1875), and John Fiske, "Outlines of Cosmic Philosophy" (2 vols., 1875). Of these, President Porter and President Hickok may be named among the foremost of elaborate original contributors to philosophy, while Dr. Krauth, Dr. H. B. Smith, and W. T. Harris are eminent especially in the critical sphere. President Porter in his "Human Intellect," while presenting a critical and historical exposition of the leading systems, teaches a philosophy "pronounced and positive in the spiritual and theistic direction, as contrasted with the materialistic and anti-theistic tendency" of the time, and is in strong sympathy with the methods of Trendelenburg; while President Hickok, familiar especially, among other German systems of thought, with that of Kant, aims by his peculiar philosophy to establish certainty on inexpugnable grounds, to this end seeking to establish the coincidence of the subjective idea with the objective law. President McCosh, while making original contributions to a philosophy in the main coincident with that of Reid and Hamilton, is also the historical critic of the Scottish philosophy.—The principal general histories of philosophy are: Brucker, *Historia Critica Philosophiæ* (5 vols., Leipsic, 1742–'4); Tiedemann, *Geist der speculativen Philosophie* (6 vols., Marburg, 1791–'7); Tennemann, *Geschichte der Philosophie* (11 vols., Leipsic, 1798–1819; an English translation of an abridged edition was made by Arthur Johnson, Oxford, 1832, and revised by J. D. Morell, London, 1852); Windischmann, *Die Philosophie im Fortgang der Weltgeschichte* (3 vols., Bonn, 1827–'34); Hegel, *Geschichte der Philosophie* (3 vols., Berlin, 1833–'6); Ritter, *Geschichte der Philosophie* (12 vols., Hamburg, 1829–'53; partly translated by Morrison, 4 vols., London, 1838); Schwegler, *Geschichte der Philosophie* (Stuttgart, 1848; translated by Seelye, New York, 1856); Lange, *Geschichte des Materialismus*, &c. (Iserlohn, 1866; 2d ed., 1873); Ueberweg, *Geschichte der Philosophie* (Berlin, 1871; translated by Morris, 2 vols., New York, 1872); De Gérando, *Histoire comparée des systèmes de philosophie* (2d ed., 4 vols., Paris, 1822–'3); Cousin, *Cours de philosophie morale* (1840–'41); Enfield, "History of Philosophy," derived from Brucker (2 vols., London, 1791); Lewes, "Biographical History of Philosophy" (London and New York, 1847; 2d ed., 1871); Maurice, "Moral and Metaphysical Philosophy" (2 vols., London, 1872). The best special history of occidental philosophy is by Röth, *Geschichte unserer abendländischen Philosophie* (2d ed., 2 vols., Heidelberg, 1862). The principal special accounts of ancient philosophy are: Zeller, *Die Philosophie der Griechen* (Tübingen, 1844); Jules Simon, *Histoire de l'école d'Alexandrie* (2 vols., Paris, 1844–'5); Vacherot, *Histoire critique de l'école d'Alexandrie* (3 vols., Paris, 1846–'51); and W. A. Butler, "Lectures on the History of Ancient Philosophy," edited by Thompson (2 vols., Cambridge, 1856; revised ed., 1 vol., London, 1874). Special works on the scholastic philosophy are: Rousselot, *Études sur la philosophie dans le moyen âge* (3 vols., Paris, 1840–'42), and Hauréau, *De la philosophie scholastique* (2 vols., Paris, 1851). The principal histories of modern philosophy are: Kuno Fischer, *Geschichte der neuern Philosophie* (3 vols., Mannheim, 1854–'60); K. L. Michelet, *Geschichte der letzten Systeme der Philosophie in Deutschland* (2 vols., Berlin, 1837–'8); Chalybäus, *Entwickelungsgeschichte der Philosophie* (translated into English, Edinburgh, 1854); Rémusat, *De la philosophie allemande* (Paris, 1845), and *Histoire de la philosophie en Angleterre depuis Bacon jusqu'à Locke* (2 vols., 1875); Taine, *Les philosophes français au XIX*^{e} *siècle* (Paris, 1856; 2d ed., 1860); Debrit, *Histoire des doctrines philosophiques dans l'Italie contemporaine* (Paris, 1859); and Morell, "An Historical and Critical View of the Speculative Philosophy of Europe in the 19th Century" (2d ed., 2 vols., London, 1857). The most valuable cyclopædias of philosophy are: Krug, *Allgemeines Handwörterbuch der philosophischen Wissenschaften* (4 vols., Leipsic, 1827–'8); and Franck, *Dictionnaire des sciences philosophiques* (6 vols., Paris, 1844–'52). The principal periodical devoted entirely to metaphysics is the *Zeitschrift für Philosophie und philosophische Kritik*, founded at Bonn under a slightly different title in 1837, and published at Halle since 1847.

PHILOSOPHY, Moral. See Moral Philosophy.

PHIPS, or **Phipps**, Sir **William**, governor of Massachusetts, born in Woolwich, Maine, Feb. 2, 1651, died in London, Feb. 18, 1695. He was one of 26 children by the same father and mother, 21 of whom were sons. He was at first employed as a shepherd, and at the age of 18 bound himself apprentice to a ship carpenter. In 1673 he removed to Boston, where he learned to read and write. In 1684 he went to England to procure means to recover a Spanish treasure ship wrecked near the Bahamas. With a national vessel furnished him by the admiralty he did not succeed; on a second attempt, in which the means were supplied by the duke of Albemarle, he recovered treasure to the amount of £300,000, of which £16,000 was given him as his share, and he was knighted and appointed high sheriff of New England. Disagreeing in this capacity with some other officers, he went again to England. In 1690 he commanded the fleet which captured Port Royal, and in the same year a much larger one sent against Quebec, which failed. Phips was a member of the North church of Boston, of which Cotton Mather was pastor, and was noted for his zeal for Puritanism; and out of deference to the wishes of Increase Mather, the agent of Massachusetts in England, he was appointed captain-general and governor-in-chief of the province in 1692. In 1694 he was summoned to England to answer complaints which had been brought against him; but he suddenly died there. He is eulogized by Cotton Mather, with whom he coöperated in the witchcraft delusion; but his last act as governor was to issue a general pardon to all convicted or accused of this offence.—See "Life of Sir William Phips," by Francis Bowen, in Sparks's "American Biography," vol. vii.

PHLEBITIS (Gr. φλέψ, φλεβός, a vein), inflammation of the veins. It was first noticed by John Hunter in 1784; numerous isolated cases were soon after published, and in the early part of this century the disease was fully illustrated by French pathologists. Phlebitis is of two kinds, adhesive and suppurative. Adhesive phlebitis is a local disease, marked by a dull pain in the part, by swelling, hardness, and tenderness of the affected vein, and, when this is a main venous trunk, by œdema of the parts whose blood is returned by it; phlegmasia dolens is thus properly a phlebitis. Fibrinous clots are formed adhering to the walls of the vein; but after a time the adhesions become loosened, the clots are absorbed, and the circulation through the vein is restored. The disease, except where the blocking up of a main trunk may cause embarrassment to the circulation, is not serious; rest and the application of a few leeches along the course of the vein will cure it.—In suppurative phlebitis the local symptoms are often little marked, while the general symptoms are of the gravest character. It ordinarily commences by a marked chill, repeated at irregular intervals, in some cases several times a day, throughout the disease. The chills are followed by heat of skin and great frequency of pulse, terminating generally in a profuse sweat. The appetite is totally lost, the tongue is red and dry, sometimes sordes of the teeth and mouth are present, and sometimes there is copious and offensive diarrhœa. Abscesses may make their appearance, or one or more of the joints may become distended with pus. After death pus is often found in the veins, with multiple abscesses in the parenchyma of the lungs or liver. The disease is almost necessarily fatal. The system of the patient should be supported by appropriate food, quinine, and stimulants.

PHLEBOTOMY. See BLOODLETTING.

PHLEGMASIA DOLENS. See MILK LEG.

PHLIUS, an ancient independent city in N. E. Peloponnesus. Its territory, Phliasia, was bounded N. by Sicyonia, E. by Cleonæ, S. by Argolis, and W. by Arcadia, and consisted of a small valley, 900 ft. above the sea, enclosed by mountains. The river Asopus flows through the middle of the plain. Phlius was a Doric state, and usually governed by an aristocracy, although once subject to the tyrant Leon, a contemporary of Pythagoras. It sent 200 soldiers to Thermopylæ and 1,000 to Platæa, and during the Peloponnesian war was the faithful ally of Sparta. Afterward a division arose in the city, and the friends of the Lacedæmonians were banished; but in 393 B. C. the Phliasians received from Iphicrates so severe a defeat that they were forced to admit a Lacedæmonian garrison for their defence. In 380 and 379 Phlius sustained from Agesilaus, at the head of a Spartan army, a siege of one year and eight months. Having surrendered, it remained faithful to Sparta during the Theban war, was governed by tyrants after the death of Alexander, and subsequently joined the Achæan league. In antiquity the wine of Phlius was famous. The ruins of the city, near the village of St. George, are of considerable extent, but present little more than the foundations. In the present kingdom of Greece Phliasia forms part of the eparchy of Corinth, in the nomarchy of Argolis and Corinthia.

PHLOGISTON. See CHEMISTRY, vol. iv., p. 360.

PHLOX (Gr. φλόξ, flame, the ancient name for *lychnis*, applied to these plants by Linnæus), an exclusively North American genus of plants, including several highly ornamental species. It belongs to the small family of *polemoniaceæ*, and comprises annual and perennial herbs, with opposite sessile and entire leaves, and flowers in cymose clusters, terminal or in the axils of the upper leaves; the narrow five-toothed calyx is plaited or angled; the salver-shaped corolla has a long slender tube, and a flat, spreading, five-lobed limb, twisted in the bud; the five short and unequally inserted stamens are included in the tube; ovary three-celled, ripening into a pod with a single seed in each cell. The only annual species in cultivation is Drummond's phlox (*P. Drummondii*), named in honor of the distinguished botanical collector who sent it from Texas in 1835, and whose prediction in regard to its future popularity has been more than fulfilled, as there is no other annual so generally cultivated in the flower garden. The plant in its wild state is

Drummond's Phlox (Phlox Drummondii).

about a foot high, spreading, and pubescent with somewhat viscid hairs; the flowers of a deep rose color, darker at the centre, with a yellow throat, and very attractive before cultivation had wrought any change in it. A wide extent of prairie covered with this phlox is a sight long to be remembered. This is one of the plants which, in gardener's language, "break" readily, and in the comparatively short time it has been in cultivation it has produced a great number of varieties, new ones being added to the list yearly; it now includes pure white, white with purple eye, purple, violet, lilac, rose, crimson, and intense scarlet colors, with intermediate shades; besides these there are striped and marbled sorts, dark kinds with light centre, and even a pale yellow. If the seeds are started under glass and the plants set out in June, they will keep up a continuous and profuse bloom until frost comes.—One section of the perennial species has low, tufted, creeping stems, upon which are crowded narrow evergreen leaves, and bear flowers in flat clusters on short stems which lift them just above the leaves; some species of this section are found only on the Rocky mountains and in arctic America, but one is quite common on rocky hills from New York W. and S., and has long been cultivated in gardens under the name of moss pink; it forms dense broad mats, which in April and May are covered with rose-colored flowers with a darker eye; there is a white variety, and one with white flowers with a rose-colored eye. *P. pilosa*, *P. reptans*, and *P. divaricata* are low early-flowering species, sometimes seen in cultivation. The perennial phloxes or hardy herbaceous phloxes of the catalogues, sometimes absurdly called French lilac, are garden varieties derived from our *P. divaricata* and *P. maculata*, so hybridized and crossed that it is difficult to trace their parentage; they are smooth, have erect stems with large leaves tapering or heart-shaped at base, and with a large terminal oblong or pyramidal panicle of flowers. Florists make two divisions: *decussata*, including those which have strong stems 1 to 4 ft. high, and *suffruticosa* for those with slender stems from 1 to 2 ft. high. The named varieties form a large and constantly increasing list, and present a wide range of color from the purest white to crimson, purple, and scarlet, with every intermediate shade, and also flowers with distinct centres, with stripes and marblings and various shadings and blendings of colors; some begin to flower in June, others appear later, and it is possible to have a constant succession through the season.

Moss Pink (Phlox subulata).

Herbaceous Perennial Phlox—Garden Hybrid.

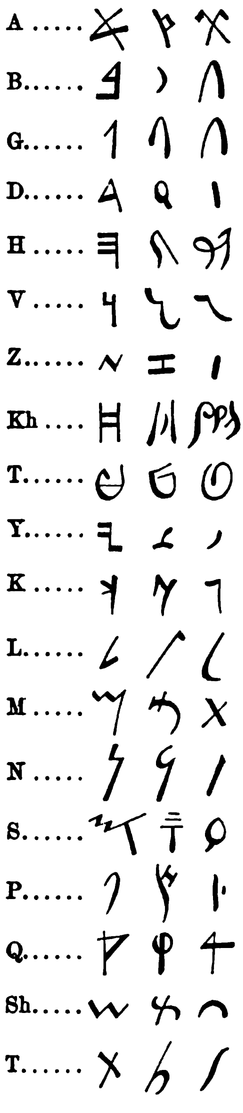
PHOCÆA, an ancient town of western Asia Minor, on a peninsula extending into the Ægean between the Cymæan and Hermæan gulfs, about 25 m. N. W. of Smyrna. According to the legend, it was founded by Philogenes and Damon, two emigrant Athenians. Under rulers of the race of Codrus, it belonged to the Ionian confederation, and became one of the most important Asiatic ports. According to Herodotus, the Phocæans were the first Greeks who made extended voyages. Finding themselves unable to hold their city when besieged by Harpagus, the general of Cyrus, the inhabitants took advantage of a day's truce to place their families and property on board ship, and set sail for Chios. After vainly endeavoring to buy from the Chians the island group of the Œnussæ, they decided to settle in Corsica, where they had already planted a colony. Before their final departure from the Asiatic coasts they landed again at Phocæa and slaughtered the Persian garrison left there by the conquerors. Leaving their own country with an oath never to return to it, such as desired to settle in Corsica again embarked. Their Corsican colony, Alalia, soon became so powerful as to excite the fears of its neighbors, and after some conflict the Phocæans again migrated to Rhegium in Italy, and finally to Lucania. Under the Persian government Phocæa quickly lost its importance, little being recorded of it for some centuries, until it was twice besieged and taken by the Romans. Its ruins are now called Karidja (Old) Fotcha, and near them is Yenidje (New) Fotcha or Foggia Nova, a place built by the Genoese about 1421 near the site of the ancient town. Massilia (Marseilles) was founded by Phocæans, as were many other important ports on the Mediterranean and its connected seas.

PHOCION, an Athenian general, born about 402 B. C., put to death in 317. He studied under Plato and Xenocrates, and first distinguished himself in the naval victory gained at Naxos in 376 by the Athenians. Sent into Eubœa about 350 at the head of a small force to assist Plutarch, tyrant of Eretria, he was betrayed by the latter; but he finally gained a complete victory at Tamynæ over the party of Philip of Macedon. In 340 he was sent with a fleet to the relief of Byzantium, then closely besieged by the Macedonians, and forced Philip to retire from the Chersonese. Phocion was, however, an advocate of the temporizing policy of the peace party, and thus stood in opposition to Demosthenes. When Thebes, on the reported death of Alexander, declared itself independent of Macedon, the Athenians were prevented by his influence from giving them assistance and occupying the pass of Thermopylæ. A little later he advised compliance with the demand of Alexander that the ten leaders of the anti-Macedonian party should be given up, which proposition was indignantly rejected; but he nevertheless headed the second embassy, by the agency of which the demand was waived. After the death of Alexander, he was one of the envoys sent to Antipater, and only succeeded in concluding a treaty most unfavorable to the Athenians. He was now at the head of the Macedonian party in Athens. On the return of the Athenian exiles, and the restoration of the democratic government, he fled to Polysperchon in Phocis, by whom he was sent back to Athens for trial. With four others he was condemned to drink the hemlock. He charged his son not to hold evil memory of the Athenians, and it is said was called upon to pay for his own execution, the poison having been exhausted and the jailer refusing to procure any more without compensation. Shortly after Cassander obtained possession of the city the oligarchical party regained power, and celebrated Phocion's funeral obsequies at the public expense, erected a statue in his honor, and punished his accusers. Phocion was a man of great courage, a good general, and above all free from the least suspicion of personal corruption. He was elected the unparalleled number of 45 times to the office of general. Although he was not a professed orator, his brief and powerful speeches and his sarcastic manner exerted so great an influence, that Demosthenes, on seeing him rise, once said: "Here comes the cleaver of my harangues."

PHOCIS, a country of central Greece, bounded N. by the territories of the Locri Epicnemidii and the Locri Opuntii, E. by Bœotia, S. by the Corinthian gulf, and W. by Doris and Ozolian Locris. At one time it also comprehended a port on the Eubœan channel, called Daphnus. The principal city of Phocis was Delphi. The next in importance was Elatea, on the left bank of the Cephissus, commanding the road leading from the north of Greece to Bœotia and Attica. Other important cities were Cirrha, the port of Delphi, Anticyra or Anticirrha, and Abæ. The surface is exceedingly mountainous. The Parnassus range extends over the greater portion of it, the southern branch of the chain called Cirphis touching the Corinthian gulf between Cirrha and Anticyra. Below this range are several fertile valleys, of which the largest was the celebrated Crissæan plain. Between Parnassus and the Locrian mountains on the north is the valley of the Cephissus, the largest river, which embraces a few fertile though narrow plains. The chief importance of Phocis is due to the fact that the oracle of Delphi was within its boundaries. The Phocians proper, who inhabited both banks of the Cephissus, formed a confederation, which assembled at Daulis in a building called Phocicum. This confederation maintained its freedom, although frequently attacked by the Thessalians; and the latter, at the time of the invasion of Xerxes, led the Persian troops into Phocis, and destroyed 12 cities. Originally the temple of Delphi had been in their power, but they were early deprived of it by the Delphians, who held it till about 450 B. C. It now came again into the hands of the Phocians, and both Lacedæmonian and Athenian forces marched into their territory, the former to attack, and the latter to defend. They held possession of the temple until the peace of Nicias (421), having been during the preceding ten years of the Peloponnesian war firm allies of the Athenians. But by the terms of that peace the Delphians resumed their sovereignty over the temple, which remained in their hands until the sacred war. After the battle of Leuctra in 371, the Phocians came under the dominion of the Thebans, and remained in that condition until the death of Epaminondas, when they asserted their independence. For this the Thebans persuaded the amphictyons to enforce an old edict ordering the Phocians to pay a fine for having occupied a tract of land near Cirrha belonging to the temple of Apollo at Delphi. Their refusal gave rise to the sacred war, which lasted from 357 to 346, in which the Phocians maintained themselves by despoiling the temple, and were only reduced by the strategy of Philip of Macedon. A decree was hereupon issued by the amphictyons that the towns of Phocis, numbering 22, should be destroyed with the exception of Abæ, that the inhabitants should be scattered into villages, that no village should contain more than 50 dwellings, and that the inhabitants should repay to the temple the treasure they had taken, contributing each year 50 talents. The operations of the war which Philip afterward carried on against the Thebans and Athenians were principally in Phocis, and its people fought at the battle of Chæronea on the side of Greek independence.—Phocis now forms with Phthiotis a nomarchy of the kingdom of Greece. (See Phthiotis.)

PHŒBUS. See Apollo.

PHŒNICIA (Gr. Φοινίκη, from φοῖνιξ, a palm tree, or from the same word as signifying red), the name given by the Greek and Roman writers to the narrow region between the hills of northern Palestine and the Lebanon mountains of Syria on the east and the Mediterranean on the west. By the Phœnicians themselves their country was called K'na'an (Canaan), lowland. Its northern boundary in a political sense was near Aradus in lat. 34° 52′ N., and its southern S. of Mt. Carmel, about lat. 32° 30′; its length was about 180 m., and its general breadth from 10 to 12 m. including the mountain slopes; area, less than 2,000 sq. m. From Aradus (the Arvad of the Scriptures) to Tripolis the coast forms a bay into which several rivers fall having a short course from the mountains; the principal of them is the Nahr el-Kebir (the ancient Eleutherus). Tripolis (now Tarablus) stands on a promontory half a mile broad and extending a mile into the sea. A chain of seven small islands running out N. W. protects its harbor from the prevalent winds. S. of Tripolis a low range of chalk hills borders so closely on the sea that there is no room for a road between them. Further S. they recede a little from the sea, and on a narrow strip stands Batrun, the ancient Botrys; and still further S., on a hill by the shore, stood the city called Byblus by the Greeks (the Gebal of the Hebrews, now Jebail). A little S. of Byblus is the river Ibrim, the ancient Adonis, which was said to be annually changed into blood, and which still assumes in summer a red color derived perhaps from the ferruginous sands of the mountains from which it flows. A few miles further S. stood Berytus (now Beyrout), in a plain extending southward 12 m. to the mouth of the river Damur (the ancient Tamyras), beyond which the hills again press closely on the sea for several miles. There, on the slope of a small promontory, is seen the site of Sidon (now Saida), the oldest and one of the most famous of the cities of Phœnicia. The plain is prolonged as far as Sarepta (the Zarephath of the Old Testament), 8 m. to the south, whence it again widens and continues as far as Tyre, with an average width of about 2 m.; near that city it widens to 5 m.; 8 m. S. of Tyre (Sur) it terminates in the White promontory (Ras el-Abiad), rising perpendicularly from the sea to the height of 300 ft. The road here, which in some places hangs over the water, was cut through the rock, it is said, by Alexander the Great. Originally it appears to have been ascended by steps, and was therefore called the Tyrian *climax*, or staircase. Eighteen m. further S. Acre or Acca (the Accho of the Hebrews and the Ptolemais of the Greeks) stands on the N. projection of a bay which is about 8 m. across and is terminated on the south by the promontory of Carmel. A few miles southward was Dor, a town of considerable magnitude, next to which at no great distance the important city of Cæsarea was built by Herod the Great. Near this place, N. or S. of it according to different views, the Phœnician territory terminated. The vicinity of the Nile affects the coast of Phœnicia even as far N. as Tyre and Sidon. The set of the currents carries regularly to the eastward the alluvial matter which the river pours into the sea, and deposits it on the coast, so that towns formerly maritime have become inland, and harbors are filled up. (See Lebanon, Palestine, and Syria.)—Though the Phœnicians appear to have dwelt on the coast of Syria at the earliest dawn of history, they always considered themselves as colonists. Herodotus says they came from the Erythræan sea, that is, that part of the Indian ocean which washes the shores of Arabia and Persia, to the Mediterranean, "and having settled in the country which they now occupy, immediately undertook distant voyages; and, carrying cargoes both of Egyptian and Assyrian goods, visited, among other places, Argos." In his essay "On the Early Migrations of the Phœnicians," in his edition of Herodotus, George Rawlinson says: "The migration of the Phœnicians, at a very early time, from the shores of the southern sea to the coast of the Mediterranean, has been contemptuously ridiculed by some writers, while by others it has been regarded as a fact scarcely admitting of question. The authority of Herodotus, of Strabo, of Trogus Pompeius, of Pliny, of Dionysius Periegetes, of Solinus, and of Stephen, is quoted in favor of the movement; while against it can only be urged the difficulty of the removal, and the small value of half a dozen Greek and Roman authorities in respect of a fact admitted to be of so very remote an antiquity." Bochart, Heeren, and Movers decide against the notion of a migration, while Kenrick, Lenormant, and Schrader maintain it. The last named, in an essay on the presumptive cradle of the Semitic races (*Zeitschrift der Morgenländischen Gesellschaft*, 1873), supposes that the Phœnicians once occupied the coasts of Arabia and Persia, and, trafficking with the principal cities of Babylonia, followed the course of the Euphrates and Tigris, and crossed over to the Mediterranean coast by the usual road across Palmyra. Rawlinson says: "On the whole it may be concluded that the Canaanites and Phœnicians were two distinct races, the former being the original occupants of the country, and the latter being immigrants at a comparatively recent date." Yet the Sidonians, Arvadites, and other Canaanites of Scripture were undoubtedly the Phœnicians of classical writers. Eusebius says the Phœnicians called their country Cna, and St. Augustine says the Carthaginians spoke of themselves as Chanani, though ancient Egyptian inscriptions show that Phœnicia was also called Keft or Kaft. The original inhabitants of Phœnicia were probably Hamites, as stated in Genesis, but on being surrounded by Semitic races, by Aramæans to the north and east, and by Hebrews to the south, or overpowered by Semitic immigrants from the shores of Arabia, they gradually adopted the Semitic tongue, and forgot their own Hamitic language.—Like all ancient seafaring peoples, the Phœnicians in the early stages of their commerce committed piracy and engaged in the slave trade. But though Europe suffered from their piracy, it is certain that from their visits she received the rudiments of her civilization. The use of alphabetical characters was clearly derived from Phœnicia by all ancient European and by several oriental nations. The choicest works of art known to the earlier Greeks came from Sidon; the produce of its looms furnished the most costly offering to the gods; and its trinkets adorned the persons of the Grecian women. The Phœnicians traded where trade was profitable, and concealed from others the course they pursued to reach the distant countries to which their traffic extended. Thus, though they had supplied tin and amber for several centuries to the Greeks, Herodotus, who had visited Tyre itself, could obtain only very vague accounts of the countries in which they were produced. The master of a Phœnician merchantman bound for the land which produced tin, perceiving himself followed by a Roman ship which had been sent to learn the way, ran his vessel on the rocks to lead the rival craft to destruction; and on his return home the government remunerated him for the loss. In the Mediterranean sea they had taken possession of Cyprus, and made Paphos and Amathus their chief settlements. They occupied Rhodes until the arrival of the Dorians, and the islands of Thera, Melos, Paros, Oliarus, and Cythera, whence the whole of Greece derived the cult of Aphrodite. From the island of Thasos, where they had valuable gold mines, and from Samothrace, which from them received its peculiar worship, they carried on a large trade with Thrace. In Crete they established the colonies of Itanus and Lampe. Their settlements on the Bosporus and Pontus, however, they relinquished very early to the Greeks. They had seized all the promontories of Sicily, in which they founded Eryx and Panormus (Palermo), and the adjacent islands. Malta, Gozo, and Comino were also in their possession, and on Cossyra (now Pantellaria) was developed an independent Phœnician state of considerable maritime power. The coasts of Sardinia were dotted with Phœnician settlements, and they were in mercantile connection with the towns of Etruria. Corsica, the Baleares, and other islands served as stations for the trade with Spain, of which they occupied the S. W. portion, including Tartessus (Tarshish) and Gades (Gadira, Cadiz), and which in the beginning of the 6th century B. C. was controlled by the Carthaginians. The Phœnician factories on the banks of the rivers Garonne and Rhône, in Gaul, grew into important cities, the foundation of which, like that of Massilia, was subsequently ascribed to Hellenic colonists. The shores of north Africa were early visited and peopled by the Phœnicians. Though Carthage seems to have been founded only in the beginning of the 9th century B. C., long before that time they had in Africa the trading posts Leptis Magna, Œa, Sabrata, Gichthis, Tacape, Macomades, Capsa, Thala, Sufetula, Thebeste, Almedera, Sicca Veneria, Cirta, Utica, Hippo, and Auzea. In fact, from the Syrtis Major to the island of Cerne (now Arguin, W. of Morocco), the land was full of Phœnician factories, and on the Atlantic coast a series of towns extended down to the Lixus. The intercourse and intermixture with the Libyans gave rise to the Libyo-Phœnician race. It is not known how far they penetrated into the interior of Africa, but there are good reasons for supposing that they reached Timbuctoo and the Niger, and possibly Lake Tchad. Dan, Hamath, Myriandrus, Tarsus, and Laodicea to the north, and Joppa, Ascalon, Casium, Elath, and Eziongeber to the south of their own territory, were also stations of Phœnician trade. The Phœnicians occupied the Bahrein islands in the Persian gulf. The situation of Ophir has not been determined. (See Ophir.) Commerce with eastern Asia was carried on principally by caravans, which passed to and through the Tigris and Euphrates valley by three main routes. One of them touched Dan and Hamath, another Palmyra, and a third crossed directly the Syrian desert to the mouths of the rivers. By way of the Red sea the Phœnicians visited the eastern coasts of Africa. There is little doubt that they traded also with far eastern Asia and even with China. They visited also the lands bordering on the Caucasus, the Black sea, and the sea of Azov. It is a disputed point whether they went by sea to the British islands and other parts of northern Europe, or obtained tin, amber, and other products of those regions from the trading posts established in the interior and the south of Europe. The commerce of Phœnicia appears to have reached its height about the 8th century B. C. Ezekiel (chap. xxvii.) draws a vivid picture of the commercial splendor of Tyre at the end of the 7th century, at which period its trade directly or indirectly embraced the whole known world. For their shipping Lebanon afforded inexhaustible supplies of timber, and from Cyprus they obtained everything else that was necessary for fitting out a vessel. Sidon and Byblus among their cities appear to have enjoyed the highest reputation for naval skill. Of their vessels nothing is known, except that they were equipped for war as well as for trade; and their discipline was so good that even in Athens, the first maritime state of Greece, Xenophon cites a Phœnician ship as the best example of order and skilful arrangement that could be found. The Phœnicians were the first to apply astronomy practically to navigation, and they had noticed the connection of the moon with the tides, with which they had become acquainted in their Atlantic voyages. Of their manufactures, the most famous was that of the purple dye, which they prepared from a shell fish. As Tyre was celebrated for its purple, so Sidon was noted for its glass, the invention of which was attributed by the ancients to the Phœnicians, though they had probably learned its use from the Egyptians. The Sidonians used the blowpipe, the lathe, and the graver, and cast mirrors of glass. Hiram the Phœnician king sent to Solomon, to aid in building the temple, an artist "skilful to work in gold and in silver, in brass, in iron, in stone, and in timber, in purple, in blue, and in fine linen, and in crimson; also to grave any manner of graving." (2 Chron. ii. 13, 14.) The Phœnicians were celebrated also for the manufacture of perfumes. Their skill in mining and metallurgy was great, and their mining operations in Spain, Thasos, and elsewhere were carried on upon a stupendous scale and by very scientific methods. They carried to Egypt principally wine, oil, wool, and timber, taking in return glass wares and fine spun garments of *byssus* (either cotton or linen). They imported from Arabia myrrh, fur, and gold. They had extensive pearl fisheries in the Persian gulf. They obtained from India and China fine silks, ointments, pearls, and precious stones; from Armenia, mules and horses; from Georgia, pottery and handsome men and women; from Syria, wine and cotton; and from Palestine, wheat, barley, oil, and balm. They furnished the Hebrews with every variety of objects of industry and luxury, and the Greeks with fur, ointments, aromatic herbs, spices, and rare fishes. The coast and the interior of Africa supplied them with fruit, vegetables, timber for house and ship building, ivory, various kinds of animals, and slaves.—From the earliest period of which we have any knowledge the cities of Phœnicia were governed each by a king. Such was the condition of Canaan when invaded by the Israelites. Every town with its adjacent territory constituted a sovereignty. The monarchy was hereditary wherever we can trace its descent, but the sanction of the people was necessary to the succession, and to them the right of election reverted in case of a vacancy of the throne. In Tyre, and probably also in Sidon and the other principal cities, a powerful aristocracy existed along with the monarchy. The chief nobles seem to have held to some extent the functions of a senate. At Tyre, when the throne was vacant, the place of the sovereign was occupied by elective magistrates called *soffets* or judges. A large part of the population of Phœnicia was composed of slaves, who were brought from all parts of the ancient world, and whose numbers were such in Tyre that on one occasion they rose in insurrection and expelled the free population. The cities of Phœnicia were never united under a single monarch, but generally the superior power of some city, at first Sidon and afterward Tyre, enabled it to exercise that controlling power over the others which the Greeks termed hegemony. The three principal cities, Sidon, Tyre, and Aradus, had a place of joint meeting, the town of Tripolis, where measures of the highest importance were decided by a representative assembly. The chief defence of the Phœnicians was their naval power. When threatened by land they employed mercenary troops, for the narrow extent and limited population of their own land made it impossible to raise native armies able to cope with the Assyrians and Babylonians, or later with the Persians and Macedonians.—The principal Phœnician cities, Tyre and Sidon, were founded, according to the statement of Herodotus, about 2700 or 2800 B. C., but it is not until the time of Solomon (1000 B. C.) that we have any certain historical knowledge of their affairs. Hiram, king of Tyre, and his predecessor Abibal, are historical personages, and from them we have a regular succession of kings with dates of their reigns. The friendship and alliance of Hiram and Solomon, and the voyages of their fleets to Ophir, are recorded in Scripture. It appears from the cuneiform inscriptions that before this time Tiglath-pileser I. had marched to the Phœnician coasts, but without effecting a permanent conquest. About 915 B. C. Ethbaal, a priest, founded a new dynasty in Tyre. One of his successors left the throne to his two children Pygmalion and Elissa conjointly; but, according to the legend, Pygmalion's tyranny drove Elissa (or Dido) into exile with a large body of followers, by whom Carthage was founded. (See DIDO.) About this time, that is, about the middle of the 9th century B. C., Phœnicia was compelled to acknowledge the suzerainty of Assyria. The foreign commerce and naval power of the Phœnicians does not seem to have suffered greatly from internal feuds and invasions. The migrations of the Ionians and Dorians compelled them to relinquish some of their settlements in Grecian territory; but no serious rivalry could have existed between the Greeks and the Phœnicians before the second half of the 8th century. In the latter part of this period all the Phœnician cities except Tyre, which had regained their independence, again became tributary to Assyria. Tyre alone successfully resisted Sargon, and sustained a siege lasting five years; but about 700 it was conquered by the Assyrians, and Sennacherib placed on the Tyrian throne a creature of his own. With the exception of an effort to shake off the Assyrian yoke, made about 30 years later, Phœnicia quietly continued in vassalage until the destruction of the Assyrian monarchy, and the arrival of Pharaoh Necho, whom it acknowledged as suzerain (about 606). Nebuchadnezzar's defeat of Necho brought the Phœnicians under the rule of Babylon. They rebelled shortly after, but were again subjugated, though Tyre withstood a siege of 13 years. Soon afterward the Phœnicians went out in the service of the Babylonians to resist an Egyptian fleet, but were defeated, and their country was plundered by the Egyptians. From a recently discovered inscription, it appears that in the reign of the Sidonian king Eshmunazar the Phœnicians had obtained possession of the towns of Dor and Joppa, at the extremities of the plain of Sharon. The fall of Babylon before the arms of the Persians was soon followed by the submission of the whole of Phœnicia to Cyrus or his successor Cambyses. Under the Persian monarchy the Phœnician navy was a regular and very important element of the imperial power; but the internal constitution of the cities does not seem to have been disturbed, and the native line of kings continued to reign under the protection of the Persian sovereigns. The commerce of the cities flourished by the rich traffic of Arabia and the East which passed through their hands, and their manufactures of purple and glass were in full activity. Throughout the long struggle between Greece and Persia the Phœnicians contributed the chief naval forces of the Persian monarchs. During the reign of Artaxerxes Ochus, Sidon, which had now taken the lead among the Phœnician cities, revolted, and after a desperate struggle was betrayed by Tennes its king to the Persians in 350, and was utterly destroyed with all its inhabitants, except a few who were absent, and by whom the city was rebuilt. When Alexander invaded the Persian empire, the Sidonians submitted to him readily, but Tyre resisted, and after a siege of seven months was taken by treachery and reduced to ashes, part of the inhabitants being slain and the rest sold as slaves. Alexander rebuilt the city, but it never regained its former importance. Phœnicia was incorporated into a Macedonian province with Syria and Cilicia, and its commerce again flourished as in former ages. It afterward fell under the dominion of the Seleucidæ. In 64 B. C. the Romans conquered the country, and from that time till now Phœnicia has shared the fate of Syria. During the crusades Tyre was a port of consequence, but under the rule of the Turks, and especially after the commercial changes consequent upon the discovery of the passage to India by the way of the cape of Good Hope, it became what it remains to this day, "a rock for fishermen to spread their nets upon."—The religious and mythological conceptions of the Phœnicians have been treated at length in the article MYTHOLOGY. Their language bore a very close affinity to the Hebrew, with which most names and words preserved as Phœnician or Carthaginian by the Hebrew, Greek, and Latin writers correspond very nearly; and the only satisfactory results in interpreting the Phœnician monuments and coins have been obtained by making the Hebrew the key to their explanation. But as the ancient writers merely represented the sound of the Phœnician words, and not their orthography, one must be cautious in using them for linguistic purposes. It sometimes happens also that words are given as Phœnician which are not such. More important than the isolated words scattered through the writings of the ancients are the connected Punic texts found in the first three scenes of the fifth act of Plautus's *Pœnulus*, which are the only specimens we possess of the colloquial language of the people. No remains of Phœnician literature proper have come down to us. There is no doubt that the people had religious books, written laws, and archives and records. A court poet is mentioned on the Egyptian monuments as having been among the retinue of a Hittite (presumably Phœnician) king, and Debir, a Canaanitish (probably Phœnician) town in Palestine, was called Kirjath Sepher, "the city of the book." The Greek writers Theodotus, Hypsicrates, and Mochus are said to have translated some Phœnician books, but none of their works have been preserved. Dius and Menander of Ephesus made some extracts from the annals of Tyre which are still extant, and Eusebius gives a fragment of a translation, made by Philo of Byblos, of a cosmogony by Sanchuniathon of Berytus, but its authenticity is questioned. (See SANCHUNIATHON.) The monuments of the language which we have received directly from the Phœnicians are all inscriptions, engraved either in stone or in metal. It is to be observed, however, that only five of these inscriptions have been found in Phœnicia proper; the others come from Carthage, Numidia, Mauritania, Cyprus, Sicily, Sardinia, Marseilles, Malta, Athens, and Egypt. They are written in an alphabet which, like all Semitic alphabets, is composed wholly of consonants. This Phœnician alphabet forms the basis of all the Semitic and Indo-European graphic systems, yet to all appearance the Phœnicians based their own on the Egyptian hieratic writing. The alphabet consists of 22 signs, the forms of which vary with every age and district. The words are written from right to left, and are rarely disconnected. One may distinguish three main styles or periods of writing. The first, the archaic Phœnician, was employed from an unknown time to the 7th or 6th century B. C., not only by the Canaanites but by the Aramæans; its characteristic is great angularity in some letters, and a certain undulation in others. The second is the proper Phœnician alphabet, employed from a period subsequent to the 7th or 6th century down to the beginning of our era. The formerly angular letters received a rounder shape, and the straight strokes were made thicker in the middle than at the ends. The Carthaginian writing of this period, as well as that of Marseilles and Sardinia, gives these strokes with a certain graceful curvature, and many letters have ornamental appendages. The third or Neo-Punic alphabet belongs to the period subsequent to the Roman conquest of northern Africa, and must be a derivative of the Carthaginian cursive writing rather than of the style found on the monuments. The letters are simplified, and some are given with a single stroke; but *h* and *kh* form exceptions, being more complicated than before. Gesenius fell into the error of considering the Neo-Punic inscriptions of Numidian origin, but it has since been established that Numidian and Punic are in no manner related to each other. The grammatical structure of the Phœnician language cannot be made out from the small number of literary monuments, and hence it is impossible to define wherein it differed from the Hebrew. But it is certain that many words and forms of words used only in the poetical and archaic portions of the Bible, or only in isolated instances, are quite common in Phœnician; that some words were employed by the Phœnicians with a wider or narrower meaning than the Hebrews gave them; and that certain relatives, pronominal suffixes, and other grammatical forms are peculiar to Phœnician. As in Hebrew, it is customary to explain many peculiar forms in Phœnician as Aramæan, but it is probably more correct to regard many of them as remains of a primitive Semitic language, the parent alike of Phœnician, Hebrew, and Aramæan. The newly discovered monuments have shown the opinion formerly held, that Phœnician was a sort of mixed dialect, midway between Hebrew and Aramæan, to be erroneous. There are traces of Aramæan influence due to the movements of later times, for the whole of Palestine became Aramaic during the 7th and 6th centuries B. C. As at this time the emigration to northern Africa was strongest, it explains also the presence of Aramæan forms in the Carthaginian monuments. Punic inscriptions differ very little if at all from those of the eastern Phœnicians, and no essential differences appear in the so-called Neo-Punic monuments till after the destruction of Carthage. The commercial intercourse which the western Phœnicians maintained with the parent country, especially while the Phœnicians ruled the Mediterranean, contributed greatly to the maintenance of the mother tongue in its original condition, even in the most distant and isolated colonies. What the ancients called Libyo-Phœnician, and what was its relation to Punic, is entirely unknown; but as a matter of conjecture it seems more probable that it was Libyan infused with Phœnician, than Phœnician with Libyan, as Gesenius holds. The inscriptions published by Gesenius in 1837 hardly represent one fourth part of the number of Phœnician monuments now collected, the most important texts having been discovered since. These are the inscription on the sarcophagus of the Sidonian king Eshmunazar, two on the sacrificial tablets of Marseilles and Carthage, several of Umm el-Awamid, various trilingual ones found in Sardinia, some from Cyprus, and numerous votive and funeral inscriptions of Carthage and Numidia. At Dhiban in Moab was discovered in 1868 a monument with 34 lines of Hebrew-Phœnician. (See MOAB.)—The principal works on Phœnicia and the Phœnician language are: Heeren, "Historical Researches into the Politics, Intercourse, and Trade of the principal Nations of Antiquity" (English translation, Oxford, 1833); Gesenius, *Scripturæ Linguæque Phœniciæ Monumenta* (Leipsic, 1837); Movers, *Die Phönizier* (Bonn, 1841); Ewald, *Erklärung der grossen phönizischen Inschrift von Sidon* (Göttingen, 1856); A. Levy, *Phönizische Studien* (Breslau, 1857–'64), and *Phönizisches Wörterbuch* (1864); Renan, *Mémoire sur l'origine et le caractère véritable de l'histoire phénicienne qui porte le nom de Sanchoniathon* (Paris, 1860), and *Mission de Phénicie* (1874); De Vogüé, *Inscriptions phéniciennes de l'île de Chypre;* Lenormant and Chevallier, *Manuel d'histoire ancienne de l'Orient* (3 vols., Paris, 1868–'9; English ed., 2 vols., 1869–'70), and *Les premières civilisations* (1874); Schröder, *Die phönizische Sprache* (Breslau, 1869); Hellwald, *Culturgeschichte* (Augsburg, 1874); and Duncker, *Geschichte des Alterthums* (4th ed., Leipsic, 1874 *et seq.*).



Phœnician Alphabet.

PHŒNIX (Gr. *φοίνιξ*), a mythical bird living in Arabia, resembling an eagle, with wings partly red and partly golden. On arriving at the age of 500 years it built a funeral pile of wood and aromatic gums, and, lighting it by the fanning of its wings, was consumed to ashes, out of which arose a new phœnix. The fathers of the church employed the myth to illustrate the resurrection; and several of the Roman emperors used it on coins to typify their own apotheosis, or the return of the golden age under their rule.—See Métral's *Le phénix, ou l'oiseau du soleil* (Paris, 1824).

PHŒNIXVILLE, a borough of Chester co., Pennsylvania, on the right bank of the Schuylkill river, here crossed by two fine bridges, at the mouth of French creek, and on the Philadelphia and Reading and the Pickering Valley railroads, 25 m. N. W. of Philadelphia, and 26 m. S. E. of Reading; pop. in 1850, 2,670; in 1860, 4,886; in 1870, 5,292. The Delaware River and Lancaster railroad, a projected trunk line between New York and the west and south, is to pass through the borough, which is intersected by the Schuylkill navigation company's canal. Phœnixville has an extensive trade with the surrounding country, which is rich in agricultural resources and contains mines of iron, copper, and lead, but it is chiefly devoted to manufacturing. The Phœnix iron works cover about 150 acres, employing in brisk times about 1,500 men. There are large copper-smelting and refining works, an extensive pottery, a sash factory, and cotton mills, a public park and a fine cemetery, water and gas works, three national banks, four public school buildings with graded schools, a seminary, two weekly newspapers, and nine churches.

PHONETICS (Gr. *φονητικός*, pertaining to sound or speaking), the science of articulate sounds. Articulation depends on the organs of speech, and an adequate knowledge of their functions, and of the laws of sound, has been reached only in recent times through the labors of Brücke, Merkel, Thausing, and Helmholtz. The physiology of language, as far as it treats of the organs of speech and their functions, will be discussed under the title VOICE. In this article will be considered only the manner in which the various sounds making up a language are produced, their graphic representation being reserved for the article WRITING. Every articulation is founded on an expulsion of breath, and sounds differ according to the number and character of the obstacles encountered by a breath in the course of emission. To utter a vowel, the breath has to pass through a sort of tube formed by the mouth, and *a*, *e*, *i*, *o*, and *u* (pronounced as in Italian *ah*, *ā*, *ē*, *ō*, *oo*) are produced by simple changes in the form of this tube, and in the case of *a* and *e* also by opening the cavity of the nose. For the French nasal vowels, *un*, *on*, *in*, *an*, the soft palate is brought down and the air made to vibrate through the cavities connecting the nose and pharynx. The simplest breathing produces either the *spiritus asper* (our *h*) or the *spiritus lenis*, which the Greeks considered to be inherent in all initial vowels; but the former requires besides the mere emission of the breath a certain position of the soft palate, and the latter a pressure of the glottis. Using the tongue, the hard palate, the teeth, or the lips, to interpose further barriers, these breaths can be modified in eight different ways. By lifting the tongue against the uvula when emitting the breath, we obtain the hard German *ch*, and with a slight check of the breath the German *g;* *k* is produced by contracting the tongue and placing it against the beginning of the hard palate, and if at the same time a hard breath is made to pass through this opening, the sound of the soft German *ch* is obtained, while the softening of the breath in this position will give the *y* in the word year. The hard breathing can be modified into an *s*, the soft into a *z*, by reaching with the tongue toward the teeth. *Sh* in ship and *si* in fusion (=*zh*) are formed by somewhat hollowing the tongue when drawing it back and allowing its lower surface to rise toward the back of the upper teeth or the palate. If in emitting the *h* the tip of the tongue actually touches either the edge or the back of the upper teeth, or is introduced a little way between the teeth, the sound is changed into the English *th* in three, which can be altered into the soft *th* in thee by emitting only the soft breathing or *spiritus lenis*. The lower lip brought against the upper teeth modifies the hard breathing into an *f*, the soft into a *v*. The German *w* requires the lips to be brought together when emitting a soft breathing. When the soft palate or the tip of the tongue is allowed to tremble and to interrupt the stream of air, the intermittent sound of *r* is produced, which can be rendered more indistinct by raising the tongue and decreasing the vibrations. The sound of *l* is made by vibrating either one or both lateral edges of the tongue when placed against the upper teeth. The sounds *k*, *t*, and *p* are produced by checking the emission of breath; the first by bringing the root of the tongue against the soft palate, the second by placing the tongue against the teeth, and the third by joining the lips. The English *ch* is a union of the sounds of *t* and *sh*. The difference between *p* and *b*, *t* and *d*, *k* and *g* consists in a narrowing of the glottis for the latter, while for the former it is kept wide open. For the nasal checks *ng*, *n*, *m*, the breath is emitted through the nose, and at the same time somewhat detained. The hard aspirated checks *kh*, *th*, *ph* (=*k'h*, *t'h*, *p'h*, as in uphold with the initial vowel omitted—p'hold), of frequent occurrence in oriental languages, result from gathering the breath and letting it explode audibly as soon as the consonantal contact is withdrawn; and the soft aspirates *gh*, *dh*, *bh* are made by allowing the soft breathing to be heard after removing the consonantal contact.—Max Müller has framed the following scheme of the physiological alphabet:

PLACES.	BREATHS.			CHECKS.		
	Hard.	Soft.	Trilled.	Hard.	Soft.	Nasal.
Glottis	' as in hand	' as in and				
Root of tongue and soft palate	'h “ loch	'h “ *Tage* (G.)	ṙ	k (kh)	g (gh)	ṅ (ng)
Root of tongue and hard palate	'y “ *ich* (G.)	'y “ yes		ch (chh)	j (jh)	ñ (ny)
Tip of tongue and teeth	s “ rice	z “ to rise	l	ṭ (ṭh)	ḍ (ḍh)	n
Tongue reversed and palate	ṣ “ sharp	ẓ “ pleasure	r	t (th)	d (dh)	ṇ
Tongue and edge of teeth	th “ breath	dh “ breathe				
Lower lip and upper teeth	f “ life	v “ live				
Upper and lower lips	.	w “ *Quell* (G.)		p (ph)	b (bh)	m
Upper and lower lips rounded	'w “ which	'w “ with				

Max Müller's analysis of several sounds, and hence the grouping of the physiological alphabet, has not been universally accepted. Thus Prof. W. D. Whitney contends that his view of the essential difference between vowels and consonants will not bear examination; that his definition of *wh* as a simple whispered counterpart of *w* is clearly false; that trilling or vibration is not characteristic of an *l*, nor necessarily of an *r*; that the description of the German *ch* is both wavering and unintelligible; and that especially his account of the *spiritus asper* and the *spiritus lenis*, and his explanation of the difference between such sounds as *z*, *v*, *b* on the one hand, and *s*, *f*, *p* on the other, are to be rejected. The physical scheme of the English spoken alphabet adopted by Prof. Whitney is the following:

Sonant.		*a* (far)		Vowels.
	æ (pan)		*ǎ* (not)	
	ᴀᴇ (there)		ᴀ (all)	
	e (met)	*ə* (but)	*ǒ* (none)	
	ē (they)	ɪ (err)	*o* (note)	
	i ai, ᴀ *i* (mine, boy)		*au*, *u* (mouth, full)	
	ī (pique)	*n̩*, *l̩* (reckon, tackle)	*ū* (food)	
	y (ye)	*r*, *l* (care, bald)	*w* (woe)	Semivowels.
	ng (singing)	*n* (ant)	*m* (bosom)	Nasals.
Surd.	*h* (hue)			Aspiration.
Sonant.	*zh* (pleasure)	*z* (zone)		Sibilants.
Surd.	*sh* (nation)	*s* (goose)		
Sonant.		*dh* (breathe)	*v* (vane)	Spirants.
Surd.		*th* (path)	*f* (fane)	
Sonant.	*g* (gold)	*d* (dear)	*b* (bare)	Mutes.
Surd.	*k* (cold)	*t* (tear)	*p* (pair)	
Sonant.	*j* (judge)			Compound.
Surd.	*ch* (choose)			
	Palatal series.	Lingual series.	Labial series.	

PHONOGRAPH (Gr. *φωνή*, a sound, and *γραφεῖν*, to record), an instrument by which sounds may be recorded and reproduced. It depends, like the telephone, on the vibrations of a diaphragm corresponding to the tympanum of the ear; but, unlike that instrument, its after action is entirely mechanical. Its construction may be best understood by reference to the accompanying diagrams. In fig. 1, which is a side view of the phonograph, invented by Thomas A. Edison of New Jersey, C is a cylinder turning upon an axle supported on the standards A B, and which ends in the fly wheel E. When the cylinder is revolved by turning the crank, it is given a lateral movement by the screw thread which works over a plate beside A. A similar thread or spiral is cut on the cylinder itself. In front of the cylinder, on a standard, is a funnel-shaped mouthpiece F, which may be moved toward and from the cylinder by means of the lever H turning upon the pin I. The construction of the mouthpiece, which is similar to that of the telephone, may be best understood from the end view of the apparatus, shown in fig. 2, which is drawn in one-half scale. In this a sectional representation is given of F, which is composed of the funnel-shaped disk B B, made of hard rubber, having a small opening in its centre, and which nearly touches the plate or diaphragm A. This plate is of thin iron, about $\frac{1}{100}$ of an inch in thickness, and 2½ in. in diameter. Its under side rests on two pieces of india-rubber tubing, X X, which press against the plate so that it will respond only to forced vibrations. Below the tubes is a spring attached to E, which has at its upper end a point, P, made to fit into the spiral grooves of the cylinder C, and the distance of which from the cylinder is regulated by the screw S, against which abuts the lever H. Before using the phonograph the cylinder is coated with a sheet of tin foil, so as to cover the spiral grooves on its surface. If now the point P be brought into contact with the foil and the cylinder be turned, it will make a uniform furrow in its surface by pressing it into the spiral beneath; but if the plate A be made to vibrate by any external force, the furrow or groove traced by the point will not be uniform, but will correspond to the vibrations of the plate. As in the telephone, sounds made in the mouthpiece F induce vibrations in the diaphragm A. In the telephone these are communicated to a magnet, and through it to the wires which carry them to a distance to be reproduced by a second instrument; but in the phonograph they are permanently recorded by the point P, which indents them in all their variations on the foil around the spiral. To work the machine, the cylinder is revolved by means of the crank D, while the words are spoken close to the opening of the mouthpiece F. Every sound causes its peculiar vibration in the air, which is reproduced in the diaphragm; and as the movements of the point P are wholly dependent on those of the diaphragm, the soft and yielding foil is marked along the line of the spiral by a series of indentations of different depths, varying with the amplitudes and durations of the vibrations, which correspond to the inflections and modulations of the speaker's voice. These indentations are really visible speech; but as they must always vary in accordance with the quality and relative intensity of the voices which produce the vibrations, we can scarcely hope ever to be able to read them with the eye. But we can reproduce the sounds which caused them and which they represent. To effect this, the mouthpiece is first removed from the cylinder by pulling back the lever H. The cylinder is then reversed by turning the crank D backward until the first part of the spiral, containing the beginning of the indentations, is again brought opposite to the point P which made them. The mouthpiece is now moved up to the cylinder so that the point touches the spiral again, and is fastened in place. If the cylinder be now turned as before, so as to cause the point to traverse its former path, the latter will rise and fall with all the elevations and depressions made by it previously, and will reproduce in the diaphragm the precise vibrations which induced its original movements. These vibrations, conveyed to the ear by means of the air, excite in it the sensation of sound, and the very words spoken into the mouthpiece of the instrument are thus returned by it. As the phonograph is not yet perfected, its tones, though clear and distinct, are somewhat metallic and not very loud, and have to be reenforced by a large funnel or cone which is placed against the mouthpiece when the cylinder is turned to reproduce sounds. The cylin-

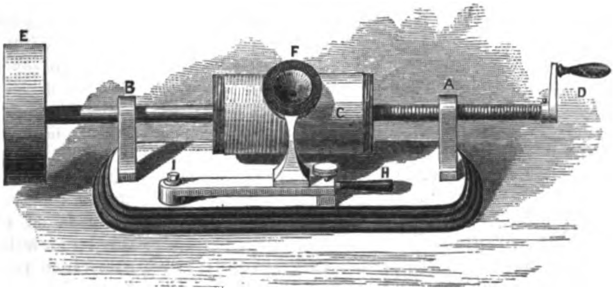


Fig. 1.

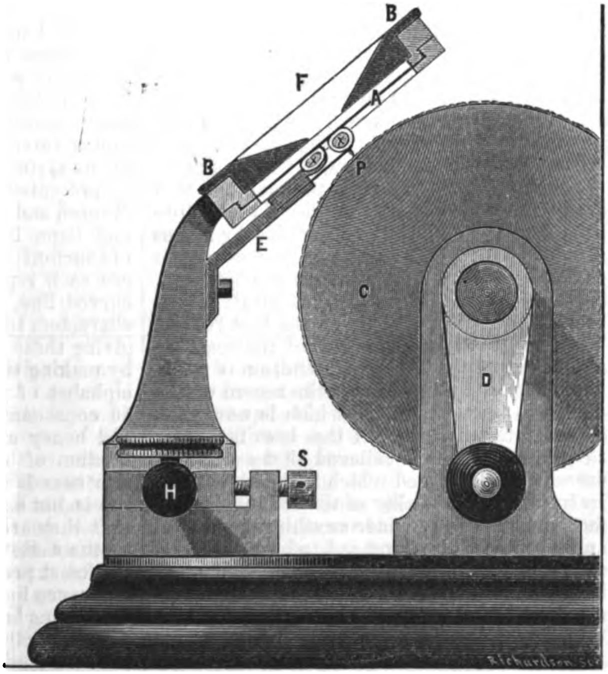


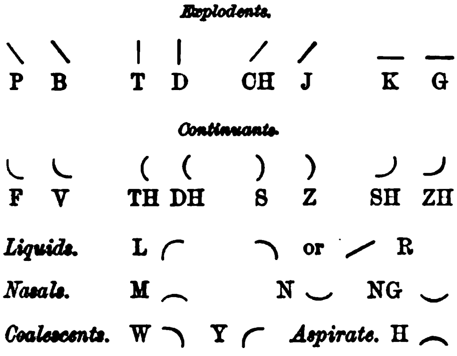
Fig. 2.

der must be rotated with the same uniform motion both when receiving and when reproducing sounds, for the tones vary with the rapidity of its rotation; if it be turned faster than when it received the sounds, the pitch of the tones will be higher, and if slower the pitch will be lower. As absolute uniformity of motion cannot be secured by turning the cylinder by hand, as is now practised, the quality of tones, or those peculiarities which constitute the difference between one voice and another, cannot be reproduced; but careful experiments have made it probable that this difficulty can easily be overcome, and that it will soon be possible to reproduce the human voice with all its modulations. To secure this absolute uniformity of motion in the instrument, the inventor has devised a train of wheels, like those of a clock, to be worked by a spiral spring and controlled by a governor, which will act automatically, and which may be started, stopped, or reversed at pleasure. This, it is believed, will cause the words of a speaker to be reproduced in the exact tones of the original. But much depends also upon the iron diaphragm which receives the vibrations and the point which records them. The diaphragm now employed is made of the thin iron ferrotype plate used by photographers. Experience has proved that this is the best thickness for the diaphragm both in the phonograph and the telephone, but thicker and thinner plates have been used with good results, and it seems that no plate is too thick or too thin for the purpose. There must be, however, a certain proportion between the thickness of the diaphragm and its diameter, and it is probable that this relative proportion is governed by some law which will eventually regulate the structure of all diaphragms. It is shown too that if the diaphragm be "damped" by inserting between it and the mouthpiece a small section of rubber tube, the vibrations obtained are more perfect. The point by means of which the vibrations are now recorded is made of steel, but its use is open to objections, and the inventor proposes to substitute a diamond point, which has given the best results. It is also hoped that the voice of the machine will be improved by the substitution of some better material for receiving the record of the vibrations than the tin foil which is now used. Thus far this has proved the best fitted for the purpose, but it is believed that something else will be discovered which will add both to the intensity and quality of the sounds. If the phonograph is to be made anything more than a philosophical plaything and to have any practical utility, it will be necessary to find some means of preserving its record, which seems impossible while it is made upon thin and yielding foil. The inventor has already devised a plan by which he confidently expects to multiply the intensity of the impressions, so that the tones may be increased indefinitely in volume; and it has been suggested that the preservation of the record may be secured by stereotyping or electrotyping it. Difficulty has been experienced in replacing the foil on the cylinder after it has once been removed; for unless the readjustment be very accurate, the sounds must necessarily be impaired. To secure this accuracy, the inventor has made a new machine in which the cylinder is superseded by a plate rotated in a horizontal plane by clockwork beneath it. The plate, which is square and about ten inches in diameter, has cut into its surface a volute spiral starting from the centre. In practice this spiral is to be covered with foil, cut to fit exactly into a place made for its reception, so that it may be removed and replaced at will, or even sent to a distance and fitted into a similar place in another instrument. Each sheet of foil has a capacity for recording about 40,000 words. An arm, at the end of which is a mouthpiece, with its point beneath, like that in the present instrument, will record the vibrations on the spiral as it revolves. It is believed that this has many advantages over the present cylinder machine, and that it will supersede it for practical use.—Mr. Edison, who is consulting electrician of the Western Union telegraph company, is the originator of the quadruplex system of telegraphy, and of the telephone which bears his name (see TELEPHONE). He is also the author of other important discoveries in electricity and magnetism.

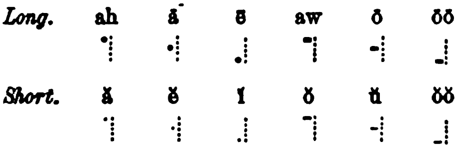
PHONOGRAPHY (Gr. φωνή, voice, and γράφειν, to write), a system of shorthand, mainly invented by Isaac Pitman, of Bath, England, and published in 1837, since when various changes have been made by the inventor and other shorthand writers. In England the only text books of the art are those that are prepared or sanctioned by the inventor; but in the United States three distinct versions or modifications of the system are in common use, substantially as presented in the text books of James E. Munson and Andrew J. Graham of New York, and Benn Pitman (a brother of the inventor) of Cincinnati. The 24 English consonant sounds are each represented by a simple straight or curved line, the requisite number of distinct characters to write them all being obtained by giving these lines four different directions, and by making them both light and heavy. In the alphabet of phonography, on p. 459, the first 16 consonants are arranged in pairs of light and heavy signs; this is because of the near relation of such sounds. By comparing the two sounds of any pair, it will be found that one is but a slight modification of the other; that they are produced at the same point and by the same contact of the organs of speech, in almost precisely the same manner, the only difference being that in one case the action of the organs is accompanied by a light or breath sound simply, and in the other the same action is accompanied by a heavy or partially suppressed vowel sound. This under tone or subvocal constitutes the only difference between the syllables *p*ay, *b*ay; *t*ie, *d*ie; *ch*est, *j*est; *K*ate, *g*ate; *f*end, *v*end; *th*igh, *th*y; seal, seal;

and *shun*, *sion* (as in *vision*). In each of these pairs the heavy stem is given to the heavy sound. The simple vowel sounds are written with a dot or a short dash placed to the consonant signs, distinction between one vowel and another being secured by writing these signs to the consonants in three places, namely, at the beginning, at the middle, and at the end, and by making them heavy for the long and light for the short vowels. The four double vowels or diphthongs, the sounds of *i* in ice, *oi* in oil, *ow* in owl, and *ew* in new, are usually represented by small angles, placed in a similar way to the consonant stems. The following is the alphabet of phonographic signs:

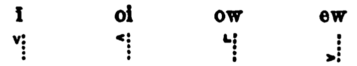
CONSONANTS.

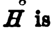


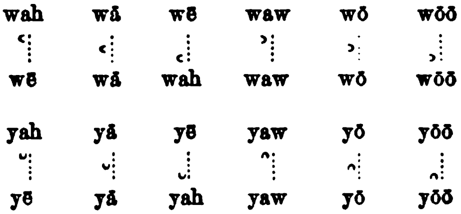
VOWELS.



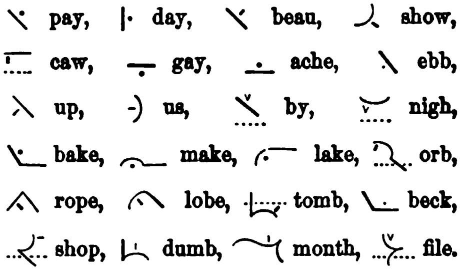
The upright skeleton line to which the dots and dashes are placed in the above table is no part of the vowel sign; it is employed merely to show the positions of the vowels, namely, first, second, and third place. The diphthongs are written as follows:



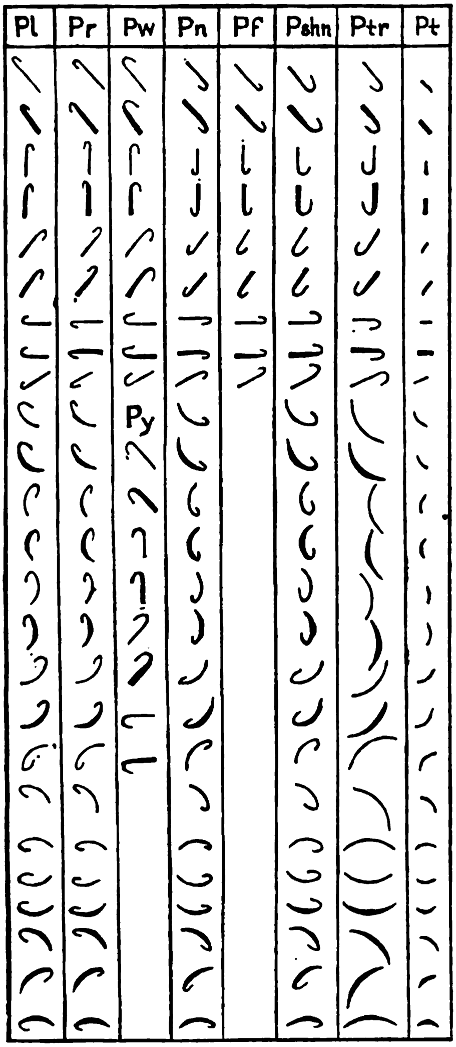
Except in regard to the letters *w*, *y*, and *h*, no change has been made in the phonographic consonant signs since the publication of Pitman's second edition in 1840. The old stem sign for *h*, and the one still given by Benn Pitman and Graham, is ; but Isaac Pitman in his later editions adopted the sign  (upward) or (downward) for *h*. *H* is also sometimes written with a light dot placed before the sign of the vowel which follows it; and in a few instances it is indicated by a tick sign joined to the stem of the succeeding consonant. Isaac Pitman also, in his later editions, varies from the above consonant table by adopting the signs *w* and *y*. The arrangement of the vowels as given in the foregoing scale, namely, *ah*, *ā*, *ē*, *aw*, *ō*, *ōō*, &c., is the one found in the works of Isaac Pitman and Munson; but Benn Pitman and Graham still adhere to the original arrangement, namely, *ē*, *ā*, *ah*, *aw*, *ō*, *ōō*, &c. The three diphthongs *oi*, *ow*, and *ew* are variously written by different authors. Both the Pitmans and Graham write the sounds of *w* and *y*, with a following vowel, by means of a small curve placed to the consonant stems in the vowel places, as shown below; the meaning of the signs according to the two vowel scales is indicated by the letters above and below the characters:



—In writing a word in phonography, the consonants are all made first without taking off the pen, and the vowel signs are written in afterward. The following are illustrations of words that are written exactly the same in all the versions of phonography:



The rule for writing the signs for the vowels when they occur between two consonant stems is as follows: All first-place vowel signs are written to the stem that precedes them; all third-place vowel signs, to the stem that follows them; of second-place vowel signs, those that are long are written to the preceding stem, and those that are short to the following stem. In addition to the simple stems of the alphabet proper, provision is made for still further abridging the phonographic writing by means of compound signs formed from the original simple stems by the addition to them of various hooks, modifications, circles, and loops. In the following table are given all of the hooks and modifications that experience has shown can be safely used by phonographic writers:


Pl
Pr
Pw
Pn
Pf
Pshn
Ptr
Pt
Py

Although there is not perfect uniformity among reporters in the use of these hooks and modifications of the stems, the general principles governing their application are the same in all. The following examples illustrate their use:

L AND R HOOK STEMS.

play, pray, glow, eagle, odor, apple, copper, noble, only.

W HOOK STEMS.

quail, quick, acquire.

N AND F (OR V) HOOK STEMS.

pun, pave, cane, cough, vain, then, flown, cunning.

SHUN AND TR (OR THR) HOOK STEMS.

caution, actor, Russian, writer, gather, rather, fashion, motion, nation.

LENGTHENING TO ADD TR OR THR.

waiter, mother, flatter, lender.

SHORTENING TO ADD T OR D.

date, pate, get, God, bad, shut, prate, plate, friend, word, patient, bottom.

The sounds of *s* and *z*, the most frequent in the language, besides having their stem signs, are also written by a small circle which is joined to straight stems, thus:

sTs, soap, sake, teas, sect, seat.

When joined to curved letters, it is turned on the inside of the curve, thus:

sTHs, sSs, save, sash, sung, sail, lace, notes.

When occurring between two stems, it is written in the shortest direction, thus:

ksj, bsj, fsl, msl, unsafe.

The *s* circle is joined to hooks by turning it on the inside, thus:

sable, supply, civil, squaw, caves, veins, occasions, actors, fashions.

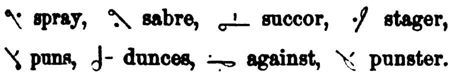
The circle is enlarged for *ss*, *sz*, &c., thus:

cases, noses, system.

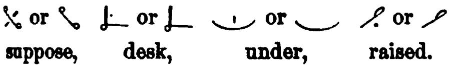
A small loop indicates *st*, and a large loop *str*, thus:

state, taste, stung, nest, store, cast, castor, master.

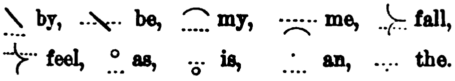
When a circle or loop is turned on the *r* or *n* hook side of a straight stem, if at the beginning the *r* hook is implied, and if at the end the *n* hook is implied, without being actually expressed; thus:


spray, sabre, succor, stager,
puns, dunces, against, punster.

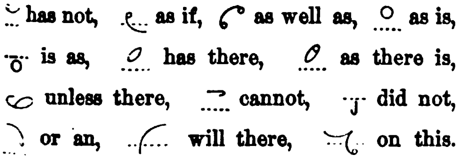
It is the practice of all experienced phonographers to omit generally the signs of the vowels in writing, it being found that with the aid of the context no trouble is found in readily reading the unvocalized consonant outlines or skeletons of words. This legibility comes partly from the fact that, as the vowels form no part of the outline, their omission does not change the general appearance of the word. See the following illustrations:


or or or or
suppose, desk, under, raised.

The writing of word outlines in the first, second, or third position (viz., above the line, on the line, or under or through the line), according as the accented vowels are first, second, or third place, is of great importance in its effect upon the reading of unvocalized phonography. The following are illustrative of this fact:


by, be, my, me, fall,
feel, as, is, an, the.

The dotted line running across or near some of these characters, and some of the other characters in this article, represents the line or ruling of writing paper. Both the brevity and legibility of phonography are greatly promoted by the use of phrase writing, that is, by joining or embracing two or more words in one outline. The following phrase signs will serve to illustrate this:


has not, as if, as well as, as is,
is as, has there, as there is,
unless there, cannot, did not,
or an, will there, on this.

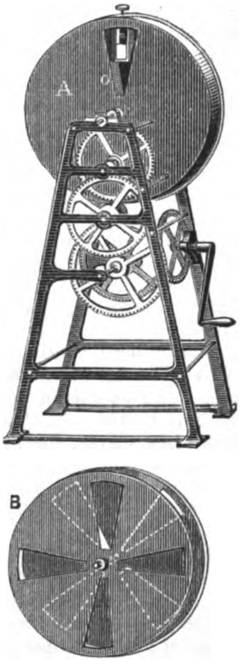
—Phonography is generally employed by reporters in this country and in Great Britain, and is also used by professional men. Since 1871 it has formed one of the regular branches of study in the college of the city of New York. The following is a complete list of phonographic text books published in America, with the dates of their first issue: "The Complete Phonographic Class Book," by S. P. Andrews and A. F. Boyle (1847); "The Phonographic Instructor," by James C. Booth (1850); "The American Manual of Phonography," by Elias Longley (1851); "The Phonographic Teacher," by E. Webster (1852); "The Manual of Phonography," by Benn Pitman (1855); "The Handbook of Standard Phonography," by A. J. Graham (1858); and "The Complete Phonographer," by James E. Munson (1866).

PHOSPHOR BRONZE, a compound formed by the addition of a small percentage of phosphorus to gun metal (bronze containing from 90 to 91 parts of copper to 9 or 10 of tin), possessing remarkable properties, in some respects like those conferred upon iron by carbon when made into steel. Experiments in making phosphor bronze have been conducted by the Messrs. Montefiore-Levi and Kunzel, near Liége, Belgium. The addition of a little over one half per cent. of phosphorus gives the metal greater fluidity in casting, and greatly increases its strength and elasticity. In trials recently made at the royal academy of industry in Berlin, a bar of phosphor bronze under a constant strain of 10 tons to the square inch resisted 408,230 pulls, while a bar of ordinary bronze broke before the strain of 10 tons to the square inch had been applied. A bar of phosphor bronze under 10 tons strain resisted 862,980 bends, while the best gun metal broke after 102,650 bends. In Austria the following comparative results have been obtained:

MATERIALS.	Resistance in lbs. per sq. in.	Point of elasticity.	Elongation per cent.
Phosphor bronze..........	81,795	54,915	1·6
Krupp's cast steel, as used for guns..................	72,258	14,450	11·0
Ordnance bronze..........	31,792	5,562	15·0

When immersed in sea water the best English copper sheets lost during six months over three per cent., while phosphor bronze sheets lost but little more than one per cent. It has been found to be superior to iron or ordinary bronze for the tuyeres of blast furnaces, and the manufacture of phosphor bronze has been commenced in this country.

PHOSPHORESCENCE, the property which some bodies possess of being luminous in the dark without the emission of sensible heat. Physicists generally recognize five kinds, designated as follows: 1, spontaneous phosphorescence; 2, phosphorescence from the effects of heat; 3, from mechanical action; 4, from the action of electricity; 5, by insolation, or exposure to the light of the sun. 1. Spontaneous phosphorescence is seen in certain vegetables and animals. The flowers of certain living plants, especially those of a bright yellow or red color, as the common marigold, sunflower, and oriental poppy, it is said, have been observed to emit flashes of faint light on fine summer evenings a little after sunset. Some plants also give out in the dark a faint continuous light, caused probably by the oxidation of some hydrocarbon which they secrete. The *phytolacca decandra* (pokeweed) gives out a greenish light in the dark. The milky juice of the *cipo de cananum*, a Brazilian plant, emits light for several hours after being drawn. The *rhizomorpha subterranea*, which grows in mines, emits light from its whole surface, and the same phenomenon has been observed in other subterranean plants. More familiar examples of phosphorescence in living organisms are seen in animals, as the glowworm and the firefly, and in the myriads of marine radiates, polyps, and infusoria, which cause the magnificent displays of phosphorescence that are often seen at sea by night, especially within the tropics and in the temperate zones during the summer. Various causes have been assigned for the phenomena of animal phosphorescence, and the causes no doubt vary with different animals. In many it is produced at a particular period of life, and in the firefly and glowworm it is regarded as being produced by an act of the will. M. Jousset has found that the liquid which exudes from the crushed eggs of the glowworm is phosphorescent, and remains so till it dries. In marine animals, according to the observations of several naturalists, a subtile luminous matter is thrown off as a secretion produced by glands having this special function, and some assert that it contains epithelial cells in a state of fatty degeneration, the decomposing fat being the cause of the phosphorescence. The light is increased by exposure to pure oxygen gas. MM. Quoy and Gaimard, during a voyage in the tropics, having placed two animalcules in a glass of water, the whole mass of the liquid immediately became luminous. The phosphorescence of decaying fish and other animal matter, and of wood (fox fire), is due to a peculiar species of slow combustion by which vibrations are excited capable of transmitting luminous rays. 2. Many solids become phosphorescent when thrown upon a heated surface, and when heated in any manner between 550° and 750° F. Such are the diamond, especially the yellow variety, certain specimens of fluor spar, oyster shells, paper, Indian meal, and numerous well dried organic substances. The light is entirely different from that of incandescence, and is generally of a blue or violet hue, instead of the dull red of incipient incandescence. When phosphorescence is produced by insolation or exposure to the rays of the sun or any intense source of light, the effect is generally greatly increased by raising the temperature of the substance at the same time. 3. Phosphorescence from mechanical action is observed when certain bodies are struck with a hammer or subjected to friction, or are broken or violently torn asunder. In many instances the effect is only coexistent with the cause; in other cases it remains for a considerable time. Adularia, a variety of orthoclase feldspar, if split by being struck with a hammer, emits at each stroke a light which often lasts for several minutes, and if ground in a mortar it will have the appearance in the dark of being all on fire. Quartz, fluor spar, rock salt, and sugar, when broken or pounded in the dark, exhibit phosphorescence. Light is sometimes emitted by bodies undergoing a state of change, especially when passing from an amorphous to a crystalline state, or during the act of crystallization from solution, and is probably closely allied to the phosphorescence of mechanical action, which latter is also often accompanied by electrical effects. 4. If a powerful electric discharge is passed through a lump of sugar, it will shine for several seconds afterward with a beautiful violet light. Many other non-conducting substances may be affected in a similar manner, but the effect never occurs with a good conductor, such as any metal. Bodies may lose the power of becoming phosphorescent by heat or by insolation, but it may be restored by the repeated passage of electric charges through them. M. Alvergniat produces phosphorescence by the action of electricity on chloride or bromide of silicon, in the following manner: A vacuum is made with a mercurial air pump in a glass tube, when the liquid chloride or bromide of silicon is introduced, which fills the space with vapor; the exhaustion is then continued until the pressure is reduced to 12 or 15 millimetres, when the tube is closed by a blowpipe flame. If it be now rubbed with a piece of silk, a bright glimmer will follow the movement of the rubber. The chloride produces a rose-colored light, and the bromide a greenish yellow. A similar phenomenon has often been observed in barometer tubes. 5. Phosphorescence by insolation, or exposure to the light of the sun, has been carefully investigated by A. E. Becquerel. Insolation produces phosphorescence most readily in those substances which are bad conductors of heat. It was first discovered in 1604 in sulphide of barium, but M. Becquerel has found that it may be excited in many other substances, the sulphides of calcium and strontium being those which exhibit it in the highest degree. When well prepared they will remain luminous in the dark for several hours after exposure to the sun's rays. This phosphorescence takes place *in vacuo* as well as in air or oxygen, and therefore the cause must be attributed to molecular action produced by the rays of light. Other phosphors which are excited by insolation are the diamond, particularly the yellow kind, most specimens of fluor spar, aragonite, calcareous concretions, chalk, apatite, heavy spar, fused nitrate of calcium (Baudoin's phosphorus), dried chloride of calcium, and a number of dried organic substances, as paper, silk, and cane, and also amber and milk sugar. Canton's phosphorus, prepared by heating sulphur with calcined oyster shells, will after exposure to the sun's rays emit a yellow light sufficient to show the time by a watch; even the light of an argand lamp will cause it to become phosphorescent. The Bolognese phosphorus, which is made by uniting heavy spar with gum tragacanth, gives out after insolation a bright light of more than a day's duration. It was found by M. Becquerel that the different rays of the solar spectrum had not the same power to render the substance phosphorescent. The greatest effect is produced by the violet rays, or even a little beyond, the phosphorescent light emitted by the substance being developed by rays of greater refrangibility than they themselves, an action closely related to fluorescence. (See FLUORESCENCE.) It may be said in general that the color emitted by phosphorescent substances varies as they are insolated by light of different parts of the spectrum. Thus Canton's phosphorus may shine with a greenish light if excited by rays from one part, while with undecomposed light it appears yellow. Phosphorescent tubes have been made in Germany and France for several years, and their preparation was kept a secret; but such tubes are now produced by several experimenters showing all the colors of the rainbow, and preparations may be made to imitate flowers and bright-colored insects, as well as landscapes. The substances, after being prepared, may be stirred in a powdered state in melted paraffine, and any design may then be painted with them on glass plates. The paraffine protects the powders from the action of moisture and prevents decomposition. The glass plates will glow for several hours after exposure to intense light with colors depending on the number and kinds of materials used. A more permanent mode of preservation is to seal the mixture in glass tubes or flat bottles. Green light may be produced by heating hyposulphite of strontia 15 minutes over a Berzelius lamp, and then fusing in a blast lamp flame. Blue is obtained by heating precipitated sulphate of strontia in a current of hydrogen gas, then over a Bunsen burner for 10 minutes, and lastly over a blast lamp for 15 or 20 minutes. Should the light be yellowish, further heating with the blast lamp is required. Yellow phosphorescence is obtained by fusing six parts of sulphate of baryta (heavy spar) with one part of charcoal over a blast lamp. At first no phosphorescence follows the fusion, but after 24 hours the substance acquires the power of emitting an orange-yellow light after exposure to the rays of the sun. A calcium or magnesium light may be employed in place of sunlight.—Since it has been found that a great number of substances remain phosphorescent for a more or less appreciable space of time after exposure to light, it becomes a question whether all bodies whose particles are capable of being put into luminous vibrations by the action of the sun's rays do not give out light for some space of time afterward. M. Becquerel invented an apparatus capable of measuring the duration of phosphorescence in different bodies, which is called a phosphoroscope. The apparatus is so contrived that the interval between the time of insolation and observation can be made as small as desired, and measured with the greatest precision. A stationary cylindrical box, A, of blackened metal, has an opening in the form of a circular sector in each end, one being exactly opposite the other. One of these openings is shown at *o*. Within the box two circular screens, also of blackened metal, one at either end, are fixed to a common axis by which they are made to revolve. Each screen has four apertures, as shown at B, of the same shape as those in the cylinders, and at the same distance from the centre. These apertures are not opposite each other, but alternate, so that a ray of light cannot pass through the machine. The substance whose phosphorescence is to be examined is placed in a stirrup suspended from the upper side of the cylinder, and may be raised or lowered by means of a milled head screw. The apparatus is placed in a window with the further side exposed to the sunlight, the machinery for turning it being inside, and the room darkened. When the body is illuminated it cannot be seen by a person in the room, because when the further screen uncovers the outer aperture of the external cylinder the nearer screen closes the front aperture. On turning the screens one eighth of a revolution, the obstacle between the object and the eye of the observer is removed, and at the same time all source of illumination is cut off behind; and therefore if the object is now visible it must be by its own light, or in other words because of its phosphorescence. If it retains its phosphorescence for a longer time than it takes for the disks to make one eighth of a revolution, it will be visible; but if it parts with it in less than that time, it will be invisible. If the revolutions are 160 a second, the length of time between the illumination and observation would be $\frac{1}{8}$ of $\frac{1}{160}$, or 0·00078 of a second. Quartz, sulphur, metals, and liquids gave no appearance of phosphorescence. The uranium compounds presented the most beautiful appearance, remaining brightly luminous 0·003 to 0·004 of a second after insolation.



Phosphoroscope.

PHOSPHORUS (Gr. φῶς, light, and φέρειν, to carry), an elementary body, discovered by Brandt of Hamburg in 1669, in the solid residue left on evaporating urine, while attempting to obtain a liquid capable of transmuting silver into gold. Kunckel, a German chemist, learned the source of the new substance and communicated the information to Kraft of Dresden, who went to Hamburg and paid 200 dollars for the details of the process. In the mean time Kunckel succeeded in preparing phosphorus. In 1680 it was noticed in the "Philosophical Transactions" of the royal society of London, and it was soon prepared in considerable quantities by Godfrey Hankwitz under the direction of Robert Boyle. In 1737 the French government purchased and published a method of preparing phosphorus from urine; but the unpleasant and expensive process was abandoned after Gahn in 1769 discovered it as a constituent of bones, and Scheele six years later devised a process for its extraction, by which burnt bones were digested with dilute nitric acid, the lime precipitated by sulphuric acid, and the filtrate evaporated to a sirup, which was then mixed with charcoal powder and subjected to distillation, phosphorus being set free and coming over as a vapor, which was condensed in water. It was afterward found to be a constituent of certain primitive rocks, especially of the mineral apatite. (See Lime, vol. x., p. 478.) The decomposition of these rocks furnishes phosphorus in the form of phosphate of calcium to the soil, from which it is appropriated by plants, these in turn supplying the animals which feed upon them, for the building of whose structures, particularly the bones and the nervous system, it is indispensable. Phosphorus is now prepared from bones and also from the native calcic phosphate. (For the chemical composition of bones, see Bone, and Bone Dust.) In the preparation of phosphorus the bones were formerly calcined in an open fire, but now the gelatine is first extracted by water with the aid of heat and pressure, or they are first made into bone black, which after being employed for refining sugar is burned. Three parts of powdered bone ash are mixed with two of concentrated sulphuric acid, or three parts of the crude acid of specific gravity 1·55 and 18 or 20 parts of water. After standing two or three days, the mixture is placed in a strong linen bag, and the liquid containing the phosphoric acid is separated from the sulphate of lime (calcic sulphate) by pressure. Water is added to the residue, and the washings are added to the filtrate. The sulphuric acid should be just sufficient to remove two thirds of the calcium, leaving the remainder as a soluble acid salt combined with all the phosphoric acid, which is often called superphosphate of lime. The reaction is shown in the following equation:

$$\underset{\text{Tricalcic phosphate.}}{Ca_3 2PO_4} + \underset{\text{Sulph. acid.}}{2H_2SO_4} = \underset{\text{Acid calcic phosphate.}}{H_4Ca2PO_4} + \underset{\text{Calcic sulphate.}}{2CaSO_4}$$

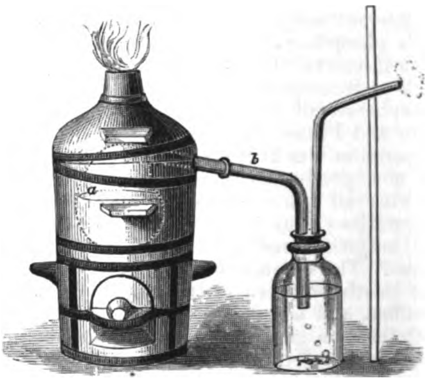


Fig. 1.—Manufacture of Phosphorus.

The acid solution, after being evaporated to a sirupy form, is mixed with one third or one half its weight of charcoal and raised to a nearly red heat in an iron pot, and then transferred while hot to an earthen retort, *a*, fig. 1. It is then gradually heated to full redness, by which means the carbon combines with the calcium base and with oxygen to produce water, tricalcic phosphate, and phosphorus. This reaction is divided into two stages. The superphosphate is first decomposed into water and calcic metaphosphate ($H_4Ca2PO_4 = Ca2PO_3 + 2H_2O$), and the metaphosphate, by the action of carbon, is reconverted into tricalcic phosphate (bone phosphate), carbonic oxide, and phosphorus, the two latter passing over in a gaseous form ($3Ca2PO_3 + 10C = 4P + Ca_3 2PO_4 + 10CO$). The phosphorus may be purified by fusing it under water containing some bleaching powder, and squeezing through wash leather. It is moulded in the form of sticks by raising it in glass tubes by atmospheric pressure.—*Properties.* Phosphorus is a soft, translucent, colorless solid, of a waxy consistency, becoming brittle at low temperatures. Its symbol is P, its atomic weight 31, and its specific gravity when solid 1·83, when liquid below its melting point 1·76 (Gladstone and Dale); its observed vapor density is 4·42; its melting point 111·5° F. If melted under an alkaline liquid and cooled slowly, it will remain for some time fluid at ordinary temperatures, but when touched with a rod will suddenly solidify. Its boiling point is 550°, an atom of its vapor occupying once and a half as much space as an atom of hydrogen. According to Deville, this relation of volumes is not affected by a temperature of 1904°. When melted phosphorus is slowly cooled, well formed dodecahedrons may be obtained. It is insoluble in water, for which reason it is usually preserved in that liquid; is soluble in oil, in petroleum naphtha, and in bisulphide of carbon. It is exceedingly inflammable, taking fire by the heat of the hand, and a blow will often kindle it. In the open air it burns with a bright flame, forming with oxygen phosphoric acid. At ordinary temperatures a stick of phosphorus emits a white smoke, which is luminous in the dark, in consequence of slow combustion, and upon this action depends one of the methods of analyzing the air. (See Nitrogen.) This slow combustion (oxidation) may be prevented by a small quantity of olefiant gas, vapor of ether, or some essential oil. It is remarkable that in pure oxygen phosphorus is not luminous until the temperature is as high as 59°, or unless the gas is rarefied, or diluted with nitrogen, hydrogen, or carbonic acid. Phosphorus assumes several different forms. The translucent variety, common or vitreous phosphorus, has been described. When this is exposed to light under water, it becomes white and opaque, somewhat less fusible, and of less specific gravity (1·515). This variety becomes reconverted into the common form at a temperature of 122° F. A third form, black and opaque, is obtained by suddenly cooling melted phosphorus, which by fusion and slow cooling returns again to the common form. A viscous form, analogous to viscous sulphur, is produced by suddenly cooling phosphorus heated to near its boiling point. A fifth form occurs in red scales, and is known as red or amorphous phosphorus. It has been carefully examined by Schrötter, and may be obtained by exposing phosphorus in a vacuum to the rays of the sun, or by subjecting it for 50 hours to a temperature of 446° to 464° F. in an atmosphere of some gas with which it does not combine. This red, amorphous, opaque variety is insoluble in bisulphide of carbon or benzole, and when exposed to the air emits no odor. Its density is greater than that of common phosphorus, being from 2·089 to 2·106. It remains unchanged in the open air till heated to 500°, when it melts and bursts into a flame, emitting dense clouds of phosphoric anhydride. When slightly rubbed with chlorate of potash, peroxide of manganese, or peroxide of lead, it detonates and inflames. On account of its property of remaining unchanged at ordinary temperatures, but of combining with the oxygen of oxygen compounds by means of friction, it is used advantageously in the manufacture of friction matches. For this purpose it may be mixed with the other materials, or with size and pounded glass and spread on paper, the match, tipped with chlorate of potash and sulphur, being rubbed upon it. Common or vitreous phosphorus taken into the stomach acts as a powerful irritant poison, but the amorphous variety may be swallowed with impunity. Those who work in common phosphorus are liable to be attacked with necrosis of the jaw bones. (See MATCH, and NECROSIS.)—*Compounds.* With oxygen phosphorus forms two definite oxides, in which the relative quantities of oxygen are as 3 to 5. They are phosphorous anhydride, P_2O_3, and phosphoric anhydride, P_2O_5. It also forms three oxidized acids: hypophosphorous acid (monobasic), HPH_2O_2; phosphorous acid (dibasic), H_2PHO_3; and phosphoric acid (tribasic), H_3PO_4. The most important of the oxides, phosphoric anhydride, is that which forms phosphoric acid by uniting with water. It occurs in the native tricalcic phosphate (apatite) and in bone phosphate. It may be prepared by burning dry phosphorus in a glass vessel to which a supply of dry air is admitted. A, fig. 2, is a glass globe with a vessel, B, containing ignited phosphorus, suspended by a platinum wire from the tube H, through which phosphorus may be added, and also ignited by means of a hot wire. C is a drying tube, containing chloride of calcium, or pumice moistened with oil of vitriol. A bent tube, D, leads into the bottle E, from which proceeds another tube, F, connected with an aspirator for drawing air through the apparatus. Phosphoric anhydride has a powerful attraction for water. Exposed to the air for a few moments, it absorbs moisture and becomes liquid, and when thrown into water combines with it, with explosive violence, being converted into phosphoric acid, and the water is so firmly bound that it cannot be separated without ultimate decomposition ($P_2O_5+3H_2O=2H_3PO_4$). It is powerfully dehydrating, abstracting water from acids, alcohols, and other bodies, and reducing oil of vitriol to an anhydride, and is one of the most powerful desiccating agents known. The pure acid is usually produced in a hydrated state by boiling one part of phosphorus in about 18 parts of nitric acid of specific gravity 1·2, which furnishes the oxygen, while nitric oxide is evolved. The nitric acid being mostly distilled off, the residue containing the phosphoric acid is transferred to a platinum vessel and cautiously heated to redness. This expels a portion of the water of hydration, leaving the acid in the form of a monohydrate, or the glacial phosphoric acid (metaphosphoric acid) of the pharmacopœia. There are three distinct forms of phosphoric acid, a fact first shown by Graham, viz.: metaphosphoric acid, HPO_3; orthophosphoric acid, H_3PO_4; and pyrophosphoric acid, $H_4P_2O_7$. These different forms retain their characteristics when dissolved in water, and form salts with one, with three, and with four equivalents of metals, which are respectively called metaphosphates, orthophosphates, and pyrophosphates. The study of these compounds has greatly assisted in forming the modern theory of saline compounds in general. Of these salts

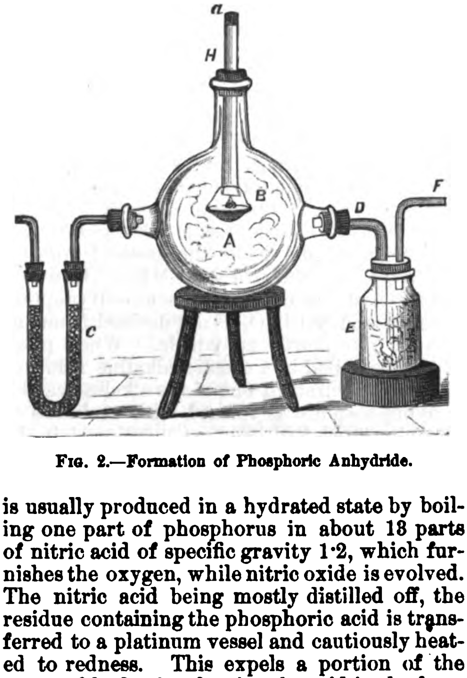


FIG. 2.—Formation of Phosphoric Anhydride.

the orthophosphates are the most common, and the most familiar example is the tricalcic phosphate, found in bones and in the mineral apatite, $Ca_3 2PO_4$. Among other common or orthophosphates are trisodic phosphate, $Na_3PO_4, 12H_2O$; sodic dihydric phosphate, NaH_2PO_4, H_2O; and triargentic phosphate, Ag_3PO_4. Among the metaphosphates are sodic metaphosphate, $NaPO_3$, and argentic metaphosphate, $AgPO_3$; and among the pyrophosphates, sodic pyrophosphate, $Na_4P_2O_7, 10H_2O$, and argentic pyrophosphate, $Ag_4P_2O_7$. Phosphorous anhydride, P_2O_3, may be obtained by burning phosphorus in a limited supply of dry air, by which a white volatile, deliquescent, inflammable powder is produced. The acid derived from this, phosphorous acid, H_2PHO_3, is formed by the union of one molecule of P_2O_3 with three of water ($P_2O_3+3H_2O=2H_2PHO_3$), and may be obtained by passing a stream of chlorine very slowly through a deep layer of phosphorus melted under water, so that each bubble of gas shall be completely absorbed by the phosphorus. Chloride of phosphorus, PCl_3 is formed, and is immediately decomposed by water into hydrochloric and phosphorous acids ($PCl_3+3H_2O=H_2PHO_3+3HCl$). By concentrating the acid liquid by heat not exceeding 390°, the hydrochloric acid is expelled and the phosphorous acid obtained in deliquescent rectangular prisms. Phosphorous acid is dibasic, and forms two classes of salts called phosphites. The normal salts have the general formula M_2PHO_3, and the acid salts $MHPHO_3$, where M represents the metallic element.—Hypophosphorous acid, HPH_2O_2, is not derived from any known phosphorus anhydride. When phosphorus is boiled in a caustic alkaline solution, or with a hydrate of one of the alkaline earths, a hypophosphite is formed with evolution of phosphuretted hydrogen, as mentioned in describing phosphuretted hydrogen. By evaporation the hypophosphite may be obtained, and by adding to it sulphuric acid the hypophosphorous acid may be obtained in solution; while if lime or baryta be used, an insoluble sulphate is separated. The salts formed by the union of this acid with bases are called hypophosphites, and they have been shown by the researches of Dulong, Rose, and Wurtz to be monobasic, and therefore constitute but a single monobasic class, of which the hypophosphite of soda, $NaPH_2O_2$, may be regarded as the type. The hypophosphites are all soluble in water and generally crystallize easily, but when the evaporation takes place at a high temperature they are converted into phosphites by absorption of oxygen.—With hydrogen phosphorus forms three compounds (phosphides or phosphurets), PH_3, PH_2, and P_2H. The first is a gas, the second a liquid, and the third a solid at ordinary temperatures. The gaseous phosphide, common phosphuretted hydrogen, may be obtained pure by heating phosphorous acid in a retort, phosphoric acid and phosphuretted hydrogen being produced ($4H_3PO_3 = PH_3+3H_3PO_4$). The gas has a density of 1·24, every two volumes containing three volumes of hydrogen and a half volume of phosphorus vapor. It has a disagreeable garlic odor, is slightly soluble in water, and burns with a brilliant white flame, forming water and phosphoric acid. Phosphuretted hydrogen may also be produced by boiling phosphorus in milk of lime or a solution of caustic alkali. The retort or flask should be very nearly filled, and a glass tube leading from it should dip under the surface of water to avoid explosions. The reaction is represented in the following equation:

$$8P+\underset{\text{Calcic hydrate.}}{3CaH_2O_2}+\underset{\text{Water.}}{6H_2O}=\underset{\text{Phosph. hydr.}}{2PH_3}+\underset{\text{Calcic hypophosphite.}}{3CaH_4P_2O_4}.$$

Calcic hypophosphite and phosphuretted hydrogen are generated. Prepared by this process, the gas has the remarkable property of inflaming spontaneously in the presence of oxygen or atmospheric air. As the bubbles come to the surface they inflame and produce beautiful rings of phosphoric acid, as shown in fig. 3, which also shows the arrangement for preparing the gas. When admitted into a jar of oxygen gas, the bursting of each bubble is attended with a brilliant flash of light and a slight concussion. The experiment should be made with caution, and the bubbles admitted singly. M. Thénard has shown that this property of spontaneous combustibility is caused by the presence of the vapor of the liquid phosphide, PH_2, which is always formed when the gas is procured by this process. It may be separated by passing the gas through a tube surrounded by a freezing mixture, when it condenses as a colorless liquid of high refractive power and great volatility. This body is removed also when phosphuretted hydrogen is kept for some time over water, whereby it loses its property of spontaneous inflammability. The vapor of the liquid phosphide in exceedingly small quantities will impart the property of spontaneous inflammability to pure phosphuretted hydrogen and to other combustible gases. By the action of light it is decomposed into gaseous phosphuretted hydrogen and the solid phosphide, P_2H, which compound is often seen on the inside of vessels in which the gas is kept; it is instantly decomposed by strong acids. Pure

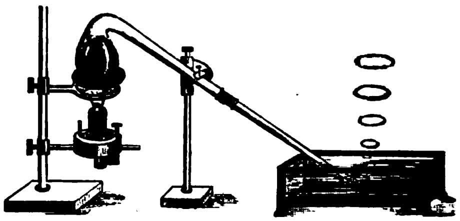


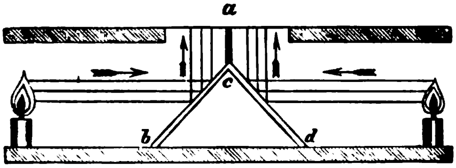
Fig. 3.—Phosphuretted Hydrogen.

gaseous phosphuretted hydrogen becomes spontaneously inflammable when raised to the temperature of boiling water. When the vapor of trichloride or pentachloride of phosphorus is passed over heated sal-ammoniac a compound is obtained, which was at first supposed to be dinitride of phosphorus, PN_2; but according to Gerhardt it contains hydrogen, having the hypothetical formula HPN_2, and has been called by him phospham. When it is heated in hydrogen ammonia is formed.—With chlorine phosphorus forms a trichloride, PCl_3, and a pentachloride, PCl_5. The trichloride may be formed by passing dry chlorine gas over dry melted phosphorus in a retort, the vapor which distils over being collected in a receiver surrounded by ice. It is a very volatile, fuming liquid, dissolving phosphorus, and being soluble in benzole and bisulphide of carbon. It is immediately decomposed by large excess of water into phosphorous and hydrochloric acids. The pentachloride is obtained by exhausting the air from a flask containing dry phosphorus and admitting chlorine, or by adding excess of chlorine to the trichloride. An oxychloride is formed, together with hydrochloric acid, when pentachloride of phosphorus is treated with a quantity of water insufficient to convert it into phosphoric acid. A sulphochloride of similar composition also exists, and an oxybromide and a sulphobromide, also of similar composition, and similarly obtained. There are two iodides, PI_2 and PI_3. Both are obtained by dissolving phosphorus and iodine together in bisulphide of carbon, and cooling the solution till crystals are deposited. There are six sulphides of phosphorus: hemisulphide, P_4S; monosulphide, P_2S; sesquisulphide, P_4S_3; trisulphide, P_2S_3; pentasulphide, P_2S_5; and dodecasulphide, P_2S_{12}. The mono-, tri-, and pentasulphides unite with metallic sulphides, forming sulphur salts, the copper salts being hyposulphosphite of copper, $CuSP_2S$, sulphophosphite of copper, $CuSP_2S_3$, and sulphophosphate of copper, $CuSP_2S_5$. Selenides are also formed of somewhat analogous composition. Most of the metallic phosphides will be found in the articles on the respective metals. (See also PHOSPHOR BRONZE.)—Phosphorus is chiefly used in the manufacture of lucifer matches, but it is also an important article of the materia medica. In small doses it acts as a powerful general stimulant, in large doses as a violent irritant poison. When not oxidized in the stomach, it is absorbed into the system, probably dissolved in oily matter. Its action, aside from its furnishing through assimilation material to the nervous system, is directed to the kidneys and genital organs, producing diuresis, and exciting the venereal passion. It has been recommended in impotency, typhoid and typhus fevers, paralysis, locomotor ataxy, and general prostration. The usual form of exhibiting it is in oily solution, sometimes dissolved in oil of turpentine. The solution may be formed into pills, each pill containing one twentieth of a grain, and one or two of them may be taken two or three times a day. It is also given in the form of diluted phosphoric acid, when it has more the properties of a general tonic and refrigerant. The dose is 20 drops of the diluted acid, taken in a wine glass of water. Phosphorus is also administered in the form of the hypophosphites, such as lime, soda, and potassa, and of iron, and also combined with iron in the form of pyrophosphate of iron. The alkaline and earthy hypophosphites have obtained considerable celebrity as remedies in tubercular consumption, in combination with a generous and fatty diet; and the pyrophosphate of iron in conjunction with calisaya bark, in the form of an elixir, is often used with great benefit as a tonic.

PHOTIUS, patriarch of Constantinople, and principal author of the Greek schism, died about 891. The place and time of his birth are unknown. He was related by the marriage of his uncles to the patriarchal and Byzantine imperial houses; and in 857 he was secretary of state to the emperor Michael III. He had made himself necessary both to the emperor and to his minister Bardas. On the deposition of Ignatius, patriarch of Constantinople, on account of his opposition to the court, Photius was installed as his successor (858). The election was made by the will of Bardas and not by the authorities of the church; the candidate was a layman, and moreover already a schismatic, adhering, as it was said, to the party of the Sicilian bishop against the Byzantine primate. Yet in six days he passed through the various grades, and was ordained patriarch. The consent of the neighboring bishops was obtained with difficulty. A council at Constantinople of 318 bishops, in 861, confirmed the election, deposing Ignatius. But this decree was soon annulled by another council, called at Rome by Pope Nicholas I., in which Photius was anathematized and ordered to relinquish his claim. Photius called at Constantinople still another council in 867, in which he excommunicated the pope, and accused the Roman church of heresy. On the death of the emperor Michael and the accession of Basil, Photius was banished and Ignatius restored; and in a council held in 869 the acts of the unlawful council held by Photius were solemnly abrogated and its records burned. After an exile of eight years, Photius was allowed to return to Constantinople; and in 878, on the death of Ignatius, he obtained the consent of both emperor and pope to his assumption of the patriarchal place. But he opposed the restoration of the Bulgarians to the jurisdiction of the Latin church, and did not recant his own heresies. A new excommunication came from Rome, the sentence of the former Roman council was reaffirmed, and in 886 Photius was finally banished by the emperor Leo to an Armenian convent, where he died.—Photius has importance in history as the founder of the Greek schism, as a dogmatist, as a philosopher, and as a literary critic. Though he did not consummate the separation between the Greek and Latin churches, he created a division which was never healed, and after him, with a few transient exceptions, no confession of supremacy could be wrung by the pope from the Greek patriarchs. He drew up charges against the Latin church, that they shortened the season of Lent, refused to allow married men to enter the priesthood, and denied to priests the right to administer the chrism, and above all that they taught the double procession of the Holy Spirit. Of his numerous works, the most important is the *Bibliotheca*, which contains fragments of nearly 300 Greek prose writers, most of whose works are lost, with critical remarks thereon. Editions of this work have been published in Augsburg (1601), in Geneva, with a Latin translation (1612), and in Berlin by Bekker (1824–'5). He also left a "Lexicon" (Leipsic, 1808; London, 1822); the "Nomocanon," a collection of canonical decrees, epistles, and statutes concerning the church (Paris, 1615); a collection of 248 letters (London, 1651); theological tracts, contained in Combefis's supplement to the *Bibliotheca Patrum;* and a treatise on "Consolation," edited by Rittershusius (Nuremberg, 1601). Some additional fragments of his writings are contained in the collection published by Cardinal Mai in 1825–'7 from the MSS. in the Vatican. An excellent monograph on Photius, by the abbé Jager, was published at Paris in 1845. See also Hergenröther, *Photius von Konstantinopel* (3 vols., Ratisbon, 1867–'9).

PHOTOGRAPHY (Gr. φῶς, light, and γράφειν, to write), the art of depicting objects by the agency of light. The earliest observations on the chemical changes produced by the agency of light were doubtless those of the fading and bleaching of vegetable colors. Of the delicate tints that may be obtained from the parts of plants, some are so sensitive to light that an exposure of only a few moments is sufficient to injure them; others resist for a longer time the conjoint action of sunlight, air, and water. It was noticed by the alchemists, probably about the 12th century, that the chloride of silver blackens by exposure to the sun, though when first prepared it is as white as snow. This darkening is in a general manner proportional to the brightness of the light. It does not occur instantaneously, but in a regulated way, a given quantity of light being apparently necessary for the production of a definite effect. As experimental chemistry was cultivated, the list of substances thus influenced became greatly extended, and when Berzelius published his work on chemistry several scores of bodies were known to be changeable by luminous agency. Some of these were elementary, and some were compounds, derived from both the inorganic and organic groups. Perhaps the first germ of photography as an art is presented in an experiment of Priestley's, who caused some chloride of silver to be deposited on the side of a glass bottle, and then putting round the bottle a piece of dark paper out of which letters had been cut with a penknife, the arrangement was exposed to the sun. All those portions of chloride upon which the light had fallen, through the spaces where the paper had been removed, turned black, but those protected by the dark paper retained their whiteness unimpaired. Scheele also made some very instructive experiments for the purpose of determining whether it was some specially colored ray of light, or light in the aggregate, that produced the result. He caused a beam to enter a darkened chamber through a hole in the window shutter, as in Newton's experiment for the decomposition of light, and, intercepting the beam by means of a glass prism, dispersed it into its constituent rays. The colored spectrum thus produced was received on a sheet of paper painted over with chloride of silver. The blackening began in the indigo or violet region, and extended in the more refrangible direction far beyond the limits of visibility. In the other direction it stopped short in the blue space, so that the green, the yellow, the orange, and the red exhibited no kind of action. From this it appears that a sunbeam does not darken the chloride of silver in virtue of its light, but that the decomposition is brought about by some other principle contained in the beam, conjoined with the light, and found to the greatest degree in the more refrangible end of the spectrum. To the rays thus recognized as occasioning the changes the designation of chemical rays was given, and they were likewise called deoxidizing rays. In observations upon the sun with reflecting telescopes, Sir William Herschel had been obliged to use colored glass screens, for the purpose of diminishing the excessive brilliancy of the light, and had accidentally noticed that the heat transmitted through these colored glasses was very far from being proportional to the light. A glass colored deeply enough to absorb a large portion of the light rays might nevertheless transmit an unexpected proportion of the heat rays. He therefore prepared a solar spectrum after the manner of Newton, and set in each of its colored spaces the bulb of a delicate thermometer. Starting from the violet and descending through the indigo, the blue, green, yellow, orange, and red, the thermometer stood higher and higher; outside of the red and beyond the visible limits of the light, it stood highest of all. No other interpretation could apparently be given to such an experiment than that the heat and the light are altogether independent agents, and distributed very differently in the spectrum. This conclusion contained, however, a most important error, which was perpetuated until a later period in these discoveries; it overlooked the physiological peculiarities of an organ of vision like the human eye. It also overlooked the physical fact that the colored spaces from the violet to the red undergo a compression through the action of the prism itself. At the violet end they are widely spread out, at the red they are concentrated. When a diffraction spectrum is used, this distortion does not occur, the colors being arranged in proportion to their wave lengths; the heating power is then equal. When therefore these peculiarities were duly considered, it was perceived that this hypothesis of the physical independence of light and heat was very far from having been established by these experiments.—The first attempt at applying these principles for the delineation of external forms is to be attributed to Mr. Wedgwood, who by imbuing leather with a solution of nitrate of silver, and exposing it under the images of a magic lantern slide, obtained what would now be termed negatives. Sir Humphry Davy made similar attempts; but as neither of these experimenters could fix the images thus obtained, their results were altogether abortive. About 1835 Prof. J. W. Draper, of the university of New York, began in the "Journal of the Franklin Institute" a series of papers on the subject. The facts investigated were chiefly in connection with the influence of light upon crystallization, the effect of colored absorbing solutions upon the chemical rays, and the interference and polarization of those rays. In his experiments, bromide of silver, and other compounds much more sensitive to light than any that had hitherto been used, were resorted to. In 1839 popular attention was suddenly directed to the subject by the announcement in France of Niepce and Daguerre's invention for the fixation of the images of the camera obscura, and simultaneously in England of that of Mr. Talbot. In the former of these the material employed was a metallic tablet of silver-plated copper, in the latter paper. With these inventions the art of photography properly speaking begins.—The process of Daguerre is as follows. A tablet of silver-plated copper is carefully cleaned, by means of pumice, rottenstone, or other suitable powders, from all adhering impurity, and is brought to a perfectly reflecting and mirror-like surface. The success of the subsequent operations turns upon the purity and perfection of this surface. The tablet is then exposed to the vapor of iodine, rising at the ordinary temperature of the air, and in succession it passes through a series of brilliant tints in the following order: pale lemon yellow, bright yellow, orange, red, blue, steel gray, clear metallic without color; then again yellow, red, &c., in the same order. Of these tints the first and second yellow are the most sensitive to light, the others comparatively sluggish. The plate is therefore only exposed until the first full yellow is reached, and then with a careful exclusion of light it is deposited in the camera obscura, so as to receive the image. Here it remains for a period dependent on the brightness of the light, the length of which the operator learns from experience. Screened from the chance access of light, it is now removed from the camera, and if it be critically examined in a dark room by the light of a feeble taper, not the slightest change or action of any kind is perceptible upon it. Nevertheless there is an image concealed, which may be easily evoked by exposing the plate to the vapor of mercury at a temperature of about 170° F. After such an exposure for three or four minutes, the picture comes forth, the camera image being reproduced nearly in its proper order of light and shade. This accomplished, it merely remains to dip the tablet in a solution of hyposulphite of soda, which instantly removes the yellow film or tarnish; and after being copiously washed in clear water and dried, the photograph is insensible to any further action of light. In this operation of Daguerre's there are therefore several successive stages: 1, the cleaning of the plate; 2, the iodizing; 3, the exposure in the camera; 4, mercurializing or development; 5, fixing. These are terms which became of current use in the art.—Mr. Talbot's invention of the calotype or photogenic drawing, as he termed it, consisted essentially in covering a sheet of paper with a changeable salt of silver, exposing it in the camera, and developing the latent image by a solution of gallic acid. The result was a negative; that is, a photograph in which the lights and shadows answer respectively to the shadows and lights of the original; while in a positive the lights correspond to lights, and the shadows to shadows. It had this advantage over Daguerre's, that it was capable of multiplication; for from such a negative, if applied face downward on sensitive paper, many positive copies could be successively obtained by exposure to the sun. The daguerreotype, however, had a superiority unapproached even to this day by any other process; its images were exquisitely defined and sharp, and given with microscopic minuteness. The reason of this superiority is obvious. The daguerreotype is formed on a mathematical surface; the photograph in a translucent substance, in which the light can be diffused, and therefore the contours of objects are never optically sharp.—At first photography was limited to artificial views and interiors. It was found unsuited for the reproduction of landscapes, the green color in which acts on the silver salts employed in a very sluggish way. The great and really valuable extension of its capabilities was that of taking portraits from the life. The initiation of this is due to Dr. Draper, who succeeded in it very shortly after Daguerre's process became known in America, and who published the first complete account of it in the "London and Edinburgh Philosophical Journal" of the following year. It is said that some of the portraits obtained by that chemist have not been since excelled. This great improvement was accomplished at a time when the inventor of the daguerreotype himself had given it up as impracticable. Two other improvements on the daguerreotype process were soon after discovered. The first consisted in more perfectly fixing the picture and deepening its shades, by the use of a salt of gold; this was due to M. Fizeau. The second consisted in the use of a much more sensitive preparation, the silver bromide; this diminished the time of exposure in the camera to about one thirtieth of what was formerly required. The original process was modified in the iodizing part, the tablet being first exposed to iodine until it became yellow, then to bromine vapor arising from bromide of lime until a faint rose red was reached, and then back again to iodine vapor for a few moments. The other stages of the operation were conducted without any modification. As was shown by Dr. Draper in the paper referred to, and others subsequently published in the "Philosophical Journal," no iodine is disengaged from the silver plate during the period of its exposure to light. The white portions of the resulting image consist of a compound of silver and mercury, a white amalgam of silver, while the shadows or dark parts are the pure silver unchanged. In an examination of some of these papers by Sir John Herschel, an opinion was expressed that the colors displayed by a daguerreotype plate, and the peculiarity of its images, depend on the thickness of the film which has been affected; but this opinion can scarcely be correct, since it is possible to copy a daguerreotype by electrotyping copper upon it, or even drying upon it a film of isinglass. The explanation given by Dr. Draper, that it is a dotted or stippled surface, the dots consisting of an amalgam of silver, is doubtless correct. Sir John Herschel communicated several elaborate memoirs to the royal society, which were published in its "Transactions." These not only refer to the optical and chemical details of the subject, but also extend it to the case of new compounds, particularly the coloring materials of flowers and plants.—But the greatest improvement in the art of photography is due to Mr. F. Scott Archer of England, who discovered the collodion process. Of this the advantages are so great, that the daguerreotype and calotype processes have become almost obsolete. It consists essentially in coating a clean glass plate with a solution of gun cotton in alcohol and ether, containing some soluble iodide. Very commonly the cadmium iodide is employed. After a momentary exposure to the air, the collodion is found adhering to the glass as a delicate film, the ether and alcohol having in part evaporated. The plate is now soaked in a solution of silver nitrate, technically called the nitrate bath, in which there must have been dissolved as much silver iodide as the solution will take up. Under these circumstances the iodides in the film become iodide of silver. The glass is now transferred to the camera, enclosed in a screen to protect it from extraneous light. The exposure is then made as in daguerreotyping, and the invisible image is developed by pouring upon the film either a solution of pyrogallic acid or of protosulphate of iron. Too great activity in these substances is prevented by the previous addition of small quantities of acetic acid. The image comes forth as a negative, and it now remains to fix it. This is done by either soaking it in hyposulphite of soda, or pouring upon it a solution of cyanide of potassium; the film is then thoroughly washed with water and suffered to dry. From this negative proofs on paper may be printed, it having been first coated with amber varnish or some other suitable material that will not soften in the sun. But if the solutions used in its preparation have been much weaker than is necessary for the production of such a negative, and the quantity of iodide smaller, a positive on glass may be obtained in the first instance. Various names have been given to such positives, according to the manner of mounting them. Thus if the plate of glass bearing the image be joined to another plate by means of Canada balsam, and viewed against a black surface, it is designated an ambrotype. For the production of such positives a very much shorter time is required in the camera than for a negative. The collodion process is of two kinds, the wet and the dry. The former is that just described. In the latter the collodion film, after being carefully washed, is coated with some preservative material, such as tannin, and then dried. Though this plate is much less sensitive than the wet one, it is more convenient for certain purposes, such as the taking of landscape views. Sometimes, through inadequate exposure to light or a want of sensitiveness in the preparations, the result obtained as a negative is not sufficiently dense, and it becomes desirable to strengthen it in order to use it for printing. Various methods have been recommended for this intensifying, as it is termed, but by far the best hitherto published is that of Dr. Henry Draper, which simply consists in applying to the collodion picture before it is dry a solution of palladium protochloride. This instantly produces an inky blackness in the dark parts, and affects in like manner the shades in the order of their gradation. It imparts no stain or impurity to the proof.—The operation of printing from a negative is thus conducted. Paper of very uniform consistency is coated on one side with a thin deposit of albumen and silver chloride, conveniently produced by soaking the paper in ammonia chloride or chloride of sodium, and then laying it on the surface of a solution of nitrate of silver. Thus prepared, the paper is placed beneath a varnished negative, and exposed to the sun. The light transmitted through the glass in its transparent parts produces blackness in the paper, but those places corresponding to the black portion of the negative remain white in the proof, the intermediate shades being of course intermediately affected. When the change has taken place to a sufficient extent, the paper is removed from beneath the negative and soaked in a solution of hyposulphite of soda. This dissolves out all the unaffected silver chloride, and leaves the picture without liability to further change. But as the tone or tint of color that it presents is commonly regarded as unpleasing to the eye, it is laid in a bath containing chloride of gold, which after a while imparts to it a delicate violet hue. Toning baths, as they are termed, of various ingredients, and capable of imparting shades of a sepia and brown tint, are recommended by different operators. They are too numerous to be here described.—The following formulas for the collodion process have been recommended: 1. For the collodion: gun cotton, 4 to 8 grains; sulphuric ether, sp. gr. ·720, 5 fluid drachms; alcohol, sp. gr. ·825, 3 fluid drachms; iodide of cadmium, 4 to 5 grains. 2. For the nitrate bath: water, 1 fluid ounce; nitrate of silver, 30 grains; as much iodide of silver as it will dissolve. 3. For the developer: water, 1 fluid ounce; pyrogallic acid, 1 grain; acetic acid, 10 to 20 minims. 4. Or this: water, 1 fluid ounce; protosulphate of iron, 12 to 20 grains; acetic acid, 20 minims. 5. For the fixing solution: water, 1 fluid ounce; cyanide of potassium, 2 to 20 grains. 6. For the fixing solution (another formula): water, 1 fluid ounce; hyposulphite of soda, ½ ounce. The following formulas may be useful in the printing process: 7. For the salting solution: chloride of ammonium, 200 grains; water, 10 ounces. 8. For the sensitizing solution: nitrate of silver, 60 grains; water, 1 fluid ounce. 9. For the fixing solution: hyposulphite of soda, 4 ounces; water, 8 ounces. 10. For the toning solution: chloride of gold, 4 grains; hyposulphite of soda, 4 ounces; water, 8 ounces. If the paper previously to being sensitized has been imbued with albumen, the resulting proofs (albumen proofs, as they are termed) have a glossy and much improved appearance. It is to be understood that a print as well as the original collodion must be thoroughly washed in clear water after the process for fixing or toning has been completed; otherwise it will be liable to a spontaneous fading away.—Among the applications of photography must not be omitted the interesting one of the stereoscope. Stereoscopic photographs may either be made by a purposely constructed camera with a pair of lenses, or by a single camera set successively in two different determinate positions. The illusion of the stereoscope gathers force from the truth of the photograph, and such pictures, from the air of solidity that they present, give a very striking result, not only in the case of portraits from the life, but also in landscapes, and especially in architectural objects.—Though photographs as now produced by the best artists are of very great beauty, they are nevertheless very imperfect. They do not critically represent the exact order of light and shade; and what is a still greater defect, they do not represent the order of luminosity, as dependent upon the coloration of the object. To the eye the yellow is the brightest color, the intensity of the light declining as we go to the violet end of the spectrum on one side, and to the red on the other. But in all the silver preparations in use among photographers, the indigo ray produces the greatest effect, and therefore may be said to possess the greatest illuminating power, and from it the intensity declines toward the violet on one side, and ceases on the other before the yellow is reached. The effect of this in a photograph may be easily understood. If two pieces of paper, one painted light yellow and the other deep indigo, be examined by the eye, the former impresses us most vigorously, and we speak of it as being bright in comparison with the other. But if a photograph of these two pieces of paper be taken, the deep indigo will come out white, and the light yellow completely black. So the real order of their visual intensity is reversed in their photographic representation. For this reason photography has given unsatisfactory results in its application to landscapes.—Nothing would tend so quickly to the improvement of photography as the invention of some means for the accurate admeasurement of light; *i. e.*, some instrument that would answer for the luminous agent, as the thermometer answers for heat. The contrivances that have been recommended may answer well enough in the hands of an accomplished chemist, but are unsuitable for the common operator. Among them may be mentioned the galvano-photometer of M. Becquerel, the chlorine and hydrogen photometer of Dr. Draper, the photometer of Bunsen, and the test paper of Roscoe.—Owing to the want of durability of photographs obtained by the aid of salts of silver, attempts have been made to substitute for those compounds others not liable to change. Among such may be classed carbon, which is altogether unalterable in the air. The carbon process has now reached a degree of perfection that will bring it into competition with the older methods. Improvements have also been made in the operation of development; that known as the alkaline development gives very satisfactory results. Recently it has been announced by Prof. Vogel that the sensitiveness of dry plates is increased by adding to the collodion certain coloring matters, such as fuchsine and chlorophyl, which impart a sensitiveness to the green and yellow rays. Promising attempts have been made by Col. Stuart Wortley, Mr. Carey Lea, and others, to get rid of the use of the nitrate bath, by covering the plates with an emulsion containing a salt of silver instead of with iodized collodion. This is the emulsion or collodio-bromide process.—From what has been said respecting visual impressions and photographic representations, it will be perceived that the agent which accomplishes the latter is not light, and that therefore the term photography is in truth a misnomer. Among those chemists who have examined the scientific connections of this subject, differences of opinion have prevailed respecting the relation between the principle thus involved and the luminous and calorific agencies. These differences of opinion have led to different designations for the rays darkening the silver preparations. Some of the earlier experimenters spoke of them as deoxidizing rays, some as chemical rays; others, in allusion to their position at the more refrangible end of the spectrum, as violet rays; others as tithonic rays; but the term that has met with most general acceptance is actinism or actinic rays. (See ACTINISM, and LIGHT.)—Optical instruments for photographic purposes must be of the most perfect kind, and provided with the necessary means for depicting a perfect image of the objects to which they are directed. They must therefore be not only achromatic in the common acceptation of that term, but also achromatic photographically, and likewise have adequate provisions against spherical aberration.—Photography is now followed as an industrial pursuit in the United States and other countries by many thousands of persons. It also possesses a very extensive literature, from the highest scientific investigations, inserted in the transactions of various learned societies and special treatises in many instances of considerable size, to periodicals. Besides those who practise it professionally, it finds amateurs everywhere. In the United States, England, France, and Germany, photographical societies are well sustained in many of the large towns. The general popularity which photography has thus attained is founded not only upon the realized perfection with which it can perpetuate external forms, but also upon the anticipated advantages to accrue from it in several of the higher departments of science. It has been employed for the purpose of permanently recording the aspect of the moon and the eclipses of the sun, and has given us representations of the planets, and even the configuration of the stars. It was very extensively employed in 1874 for recording the transit of Venus. To the microscope it has likewise been successfully applied, fixing the enormously magnified images presented by that instrument with a perfection and beauty altogether unattainable by the hand of man. In this manner questions of the utmost importance in physiology and the sciences of organization, which have long been in dispute, have received a final solution, and permanent representations have been obtained of transient phenomena occurring in living organisms. The reverse process of obtaining minute images, to be inspected under the microscope, has been found useful for various purposes. During the siege of Paris (1870-'71) letters were thus reduced for transmission by carrier pigeons, and four pages of the London "Times" were reproduced on a sheet of 8 by 5 in. In meteorology likewise, a coil of sensitive paper receiving the shadow of the mercury in the thermometer or in the barometer, or of the suspended magnetic needle, or of the index of the wind gauge, gives us trustworthy records of the temperature and pressure of the air, of the variations in terrestrial magnetism, and of the motions of the atmosphere.—The albertype is a picture in printer's ink, made by the lithographic press. To work the process, a thin, perfect negative is taken, which must not be varnished; this is coated with collodion, and when the film is dry a cut is made through it to the glass all round the edge. The plate is next soaked in water, and the film soon becomes loosened so that by raising one corner with the point of a knife it may be easily removed from the glass. It is dried and placed between the leaves of a blank book, and becomes the future negative. A piece of plate glass about half an inch thick, properly ground and polished, is coated with albumen saturated with bichromate of ammonia and dried in the dark. As soon as the film is dry the plate is placed with the film downward on a piece of black velvet, supported on a flat board. In this condition it is carried into the light, and exposed in such a way that the light has to pass through the plate glass and act upon the back of the film, which becomes indurated like leather, insoluble, and adhesive to the glass, while the front surface of the film, by reason of the black velvet, remains soluble and can be removed by washing to make room for the next coating. This coating consists of the finest gelatine and isinglass, sensitized with bichromate of ammonia. The thin negative film, prepared as previously described, is now placed face upward upon the sensitized gelatine film of the glass plate and exposed in a suitable printing frame. The bichromated gelatine, after exposure and washing in water, becomes the type plate, which is imbedded in gypsum on a marble slab previous to inking and printing. An indefinite number of impressions can be taken in this way, to keep as many presses in operation as may be required. One operator attending to one press can produce about 200 prints in a day. A graded border, with title, description, and date, can be printed at the same time, and any colored ink can be employed. All washing, toning, fixing, and mounting is dispensed with, and there is no danger of the print's fading, as the ink is carbon.—Pigment or carbon prints are made upon paper covered with gelatine. The gelatine is sensitized with bichromate of potash and exposed under a negative in a copying frame; the sheet is pressed on pieces of India rubber, developed, and transferred according to a method invented by Swan. As the gelatine may be colored any shade, perfect copies of old tracings, etchings, and drawings can be made, and there is no danger of the picture's fading. A dry tannin process has been invented by which plates are prepared in the laboratory, taken on journeys in suitable holders, exposed, repacked in the holders, and developed at home. The exposure required is long, and the manipulation difficult, so that as a general rule photographers prefer the wet silver process, as they can at once see what they are about, and if the negative is not good can make a second trial. Woodbury's photo-relief process consists in preparing a gelatine print and transferring this to soft metal by a hydraulic press. The raised parts of the gelatine film are forced into the soft metal, thus giving a picture with the light and shadows reversed. A hot mixture of gelatine, with some coloring substance, is poured upon the intaglio plate, a sheet of well sized paper is then laid on, and the whole is pressed; as soon as the gelatine is cool, the impression is removed and further fixed by alum and tannin. Osborne's photo-lithographic process is still another adaptation of bichromated gelatine. (See LITHOGRAPHY, vol. x., p. 529.)—On the fine arts the effect of photography has been important, and every day is increasing the number of its applications to artistic purposes. Soon after the discovery of the collodion process its facilities for the multiplication of copies attracted the attention of publishers. Mr. G. P. Putnam of New York was the first to introduce it practically by the insertion of some photographic views in the "Homes of American Authors" (New York, 1852). In France and Germany many splendid books have been illustrated by the same method, as the superb memorial edition of Schiller with photographs from the original drawings of eminent living artists of Germany. For the representation of scenery or the copying of old paintings, drawings, &c., it is equally available. The "Domesday Book" has been perpetuated by photography, and Tischendorf's great edition of the *Codex Sinaiticus*, one of the most ancient manuscripts of the Bible, published at the expense of the emperor of Russia, contains facsimile pages of the original produced by photo-lithography. On the art of painting, the unlimited supply of photographic studies, combining breadth of effect with nature's own minuteness of detail, is producing the most marked results; while, should the progress of photography keep pace with its past achievements, many of the laborious and expensive enterprises of engraving on steel and copper will soon be entirely superseded.—See "The Amateur's Photographic Guide Book," by W. J. Stillman (London, 1874), and "The Chemistry of Light and Photography," by Hermann Vogel (English translation, New York, 1875).

PHOTOMETRY (Gr. φῶς, light, and μέτρον, measure), the process of measuring the intensity of light. The first quantitative comparison of different sources of light with much approach to accuracy was made by Huygens about the middle of the 17th century. He used a tube having a small aperture at one end, in which was placed a minute globular lens which allowed the 27,664th part of the sun's disk to be seen. This fraction of his light being equal in brightness to the star Sirius, Huygens concluded that the distance of Sirius from the earth was 27,664 times as great as that of the sun. (*Hugenii Cosmotheoros.*) Bouguer was led, by observations of Marain on the relative intensity of the sun's light at the summer and winter solstices, to make an extensive series of investigations on the subject, and his results were published in his *Essai d'optique* (1729). His photometer compared the reflecting powers of two different surfaces by having the image of one reflected in a mirror which was placed in a line with the other surface and the eye of the observer. The two reflecting surfaces had a light placed between them, which was moved from one toward the other until the reflection of the one in the mirror was equal in intensity to the direct light from the other; and as that intensity is in proportion to the square of the distance, the reflecting or absorbing powers of the two surfaces could be readily computed by measuring the distance of the light from each of the surfaces. Lambert, ten years later, published his *Photometria*, a work of great mathematical elegance. He describes a photometer by which the reflecting and transmitting powers of different translucent materials may be accurately ascertained for various angles of incidence. The photometer of Bouguer was modified by Ritchie so that a comparison of sources of light could be made, as well as the reflective powers of surfaces. A box with the axis placed horizontally has two plane reflectors, *c b* and *c d*, cut from the same plate, placed with two edges at right angles at *c* so that rays of light parallel with the axis of the box will be reflected perpendicularly upon the oiled paper screen at *a*, a blackened diaphragm being placed at *a c*. When the lights are placed so that the illumination on both sides of *a* is the same, the square of the distance of the lights from the mirrors will give the comparative intensity. Rumford's photometer, valuable because it may be easily extemporized, employs the principle of comparing the depth of shadows, and consists of a vertical staff placed a short distance in front of a screen of tissue or oiled paper. The shadows may be compared in front, or on the back side of the paper, the latter method being preferable because the back of the paper may be in a darkened chamber, thus allowing the eye to be undisturbed by the glare of the lights. Bunsen's photometer consists of a screen of thin writing paper stretched on a frame and marked with a grease spot. If a light is placed on each side of the paper, the spot viewed from the side of strongest light



Bouguer and Ritchie's Photometer.

will appear darker than the surrounding space; from the other side, lighter. When the light falling on each side of the paper is equal, the spot and the surrounding surface will present the same shade, and the squares of the distances of the sources of light will respectively indicate their intensity. A modification of this instrument by Dr. Letheby is in common use in gas works. Masson's electro-photometer has the advantage of comparing lights of different colors. A circular disk, divided into equal white and black sectors, makes by clockwork from 250 to 300 revolutions a second. When illuminated by a constant source of light, the disk has a uniform gray tint, because of the blending produced by the duration of the visual impression; but when lighted instantaneously by the electric spark, the black and white sectors appear distinct and as if fixed. If now the constant light be continued, the intensities of two electric lights, of the same or of different colors, may be compared by removing one and then the other from the disk, until the latter appears uniformly gray. Conversely, two constant lights may be compared by carrying each toward the disk till it is uniformly gray, the illumination being primarily made by one source of electric sparks. The square of the distances in either case will be proportional to the intensities of the lights which are the subjects of examination. The general conclusions obtained from photometric observations are that flame is perfectly transparent to light; so that the luminous effect of a series of flames placed side by side is the same whether the light is received in a direction perpendicular or parallel to the line in which they are placed. In like manner a flat gas flame, such as that of a bat's-wing burner, casts the same amount of light in all directions. It has been found that when two lights are compared, of such relative intensity as that one should cast a shadow on a screen 64 times as strong as that of the other, the lesser light will in reality cast no shadow at all. Therefore it is concluded that light emanating from any source becomes imperceptible in the presence of light having 64 times its intensity. Hence, whenever the sun's light in the morning becomes 64 times as strong as that of a star, the latter will disappear; and in the evening, when it becomes less than 64 times that of a star, the latter begins to be visible. When two flames overlap each other, the intensity of the combined flame is greater than the sum of the two separate flames. This effect, first observed by Franklin, appears to be due to the increased temperature of the part where the flames overlap. Arago and Fresnel constructed lamps for lighthouses on this principle, in which several concentric wicks were arranged near to each other.—CHEMICAL PHOTOMETERS. At the end of the article on LIGHT mention is made of investigations in regard to the measurement of the chemical action of light by Dr. John W. Draper, in which he obtained his results by determining the amount of hydrochloric acid formed in a given time from the union of its gaseous elements under the influence of light. Bunsen and Roscoe have since extended these experiments, and have produced an instrument on the same principle which is capable of the most delicate measurements. It consists of three parts: 1, an apparatus for generating the two gases by electrolysis of hydrochloric acid; 2, one for exposing the gases to light; and 3, one for measuring the amount of hydrochloric acid generated by recombinations of the hydrogen and chlorine. The gas-generating apparatus consists of a battery of three or four cells connected with two carbon electrodes immersed in a vessel containing hydrochloric acid. The gases are passed through waste bulbs containing water into an insolation vessel, which has its lower part blackened, receiving the light upon its upper surface, by which the gases are made to combine. Beyond the insolation vessel is a measuring tube, beyond this a vessel of water, and after this one containing slaked lime and charcoal, to absorb chlorine. The gases are first passed through the whole apparatus until the water is saturated, when the insolation vessel is exposed to the light and the connection between it and the generating apparatus closed. Combination of the hydrogen and chlorine gases then takes place with diminution of volume, which causes the water to return through the measuring tube. The rate of movement of the water shows the diminution of volume, and consequently the amount of chemical union. Their unit of light was obtained by employing a flame of pure carbonic oxide gas burning from a platinum jet of a certain diameter and issuing at a certain rate. The apparatus is useful in measuring the chemical action of diffuse daylight, of direct sunlight, of flames from different sources, and of the different parts of the solar spectrum. A chemical photometer for registering meteorological changes was also devised by Bunsen and Roscoe, and called a pendulum photometer, by which sensitive paper was exposed to the action of light for a definite time by means of the oscillation of a pendulum. This instrument was used to measure the varying intensity of the sun's light under different positions of the sun, and of conditions of the atmosphere. Descriptions of these instruments and of the experiments made with them may be found in the "Philosophical Transactions" of the royal society of London for 1857, '59, '62, and '63.

PHRAORTES. See MEDIA.

PHRENOLOGY (Gr. *φρήν*, mind, and *λόγος*, discourse), a system of philosophy of the human mind, founded on the physiology of the brain. As a system, it had its origin in the ideas and researches of Franz Joseph Gall, a German physician. First announced by him in 1796, it began to attract attention in England about the year 1815. It was first distinctly introduced into the United States by

Dr. Charles Caldwell of Kentucky, who studied under Gall, and who between 1821 and 1832 wrote and lectured on the subject, forming phrenological societies in the large cities. But the number of its adherents was small until the period of Dr. Spurzheim's lectures, chiefly in Boston, in 1832, and the commencement of a series of lectures and cranioscopic examinations by the brothers O. S. and L. N. Fowler in 1834. The lectures of Mr. George Combe in 1838–'40 contributed much to the general introduction of the new system; and still more the "Constitution of Man" and other well known works of the brothers Combe. Since that period the number of the advocates of phrenology appears to have been greatly increased, though many of its principles are still under discussion.—Phrenology aims to include the elements of both mind and brain, with their relations, and with consequent applications in respect to the development of the mental faculties, to the conduct of the individual and social life, to education, legislation, the arts, morals, and religion. Hence, its subject matter embraces, first, a theory of psychology, and secondly, an organology, or view of the relations of cerebral parts or organs to the mental faculties; this, again, being divisible into organology proper and physiognomy in the broadest sense, or the knowing of the mental characteristics through signs, including cranioscopy (signs learned by examination of the cranium), temperaments, the features, and attitudes. It assumes that the value of all these, as signs of character, is based on a necessary correspondence, for every individual, first, between mind and brain, and secondly, between the brain on one hand and other parts of the physical organization, as well as the habits and conduct, on the other. Albertus Magnus, in the 13th century, divided the cranium into three regions, appropriating these, from before backward, to the Aristotelian faculties, judgment, imagination, and memory. Luigi Dolce, in a work on the memory (Venice, 1562), drew a chart of nine regions of the brain, answering to as many mental powers. Willis, and in 1784 Prochaska, especially advocated the doctrine of a division of the brain into organs of different mental faculties, though they did not attempt to localize such organs. Gall's first special observation seems to have been that of a prominence of the eyes in all his schoolfellows who were noted for linguistic proficiency and memory of words. Following out the hints thus obtained, he arrived, as he believed, at the functions and locations of 27 organs of mental faculties, which he naturally enough named in view of their action, or in many instances of the extravagant and perverted action under which, in their extreme development, he often found them; hence such terms as instinct of murder, vanity, &c. Of these all but one were retained by his pupil Spurzheim, who found reasons for including in one the two supposed powers of language; and who then added to the remaining number, first, by distinguishing in Gall's faculty of the "sense of things" the two powers of individuality and eventuality; and secondly, by discovering the office and seat of conscientiousness, hope, wonder, size, weight, time, order, and inhabitiveness. In George Combe's enumeration, the last named faculty was replaced by concentrativeness; and he added the localities of love of life and alimentiveness, the probable existence of which had been admitted by Spurzheim. The latter set the example of naming the faculties with reference to their tranquil manifestation and supposed normal character; and in following out this principle he introduced a new terminology. Dr. Vimont, Robert Cox, J. T. Smith, and other transatlantic writers criticised portions of both the scheme of faculties and the location of organs, and proposed changes. The brothers Fowler, S. R. Wells, and other American phrenologists admit still other faculties, increasing the number to 43; and they have changed again several of the names. The following is their latest classification (1875) of the faculties and organs which they regard as ascertained (the definitions, for the sake of condensation, being slightly modified in some instances), the whole arranged in four groups of affective and two of intellectual faculties, as follows:

DIVISION I. AFFECTIVE FACULTIES.

(1.) DOMESTIC GROUP: 1, amativeness—the sexual instinct, or impulse; A, conjugality—the pairing instinct, exclusive love of one; 2, parental love—love of offspring, love of young, or of pets; 3, friendship—the gregarious or social impulse, attachment to friends; 4, inhabitiveness—love of home and country, desire to locate, patriotism; 5, continuity—persistence of emotion or of thought, application, absorption in one thing.

(2.) SELFISH GROUP: E, vitativeness—love and tenacity of life, dread of annihilation; 6, combativeness—impulse to resist and oppose, resoluteness, courage; 7, destructiveness—readiness to inflict pain, to destroy, or to exterminate, executiveness; 8, alimentiveness—appetite for food; F, bibitiveness—fondness for water or other beverages; 9, acquisitiveness—desire to possess and own, impulse of getting and hoarding; 10, secretiveness—instinct of reserve and evasion, cunning, policy; 11, cautiousness—sense of danger or evil, desire of safety, watchfulness; 12, approbativeness—love of approval or of praise, love of display, sense of reputation, ambition; 13, self-esteem—sense of self-appreciation and self-respect, dignity, pride; 14, firmness—tenacity of will and purpose, perseverance.

(3.) MORAL GROUP: 15, conscientiousness—sense of right and truth, feeling of justice and obligation, integrity; 16, hope—sense of and happiness in future good, anticipation; 17, spirituality—sense of the unseen, faith [love of the marvellous, credulity]; 18, veneration—sense of Deity, adoration, worship; 19, benevolence—desire of human well-being, love of others, self-sacrifice.

(4.) SELF-PERFECTING GROUP: 20, constructiveness—instinct of building, ability to combine or construct [synthesis?]; 21, ideality—sense of the beautiful and perfect, of the pure and elegant, imagination (?); B, sublimity—love of the vast and grand, sense of the infinite; 22, imitation—ability to pattern after, copy, or mimic; 23, mirthfulness—sense of the absurd or ridiculous, wit, humor.

DIVISION II. INTELLECTUAL FACULTIES.

(1.) PERCEPTIVE GROUP: 24, individuality—perception of things or individual objects, curiosity to see; 25, form—perception of shape, or configuration, including features; 26, size—perception of dimension or magnitude, and quantity generally, sense of space; 27, weight—perception of effort or pressure, of force and resistance, of gravity and equilibrium; 28, color—perception of hues, tints, lights, and shades; 29, order—cognizance of arrangement, method, system; 30, calculation—cognizance of numbers, and their obvious relations; 31, locality—cognizance of place, and of situation; 32, eventuality—cognizance of events, occurrences, or facts; 33, time—cognizance of succession and duration; 34, tune—cognizance of melody and harmony; 35, language—cognizance and use of all signs of thought and feeling, words included, power of expression.

(2.) Reflective Group: 36, causality—cognizance of dependence, and of efficiency, or the relation of effect to cause; 37, comparison—cognizance of resemblances, of identity and difference, discrimination, power of analysis and of criticism; C, human nature—discernment of character and motive; D, agreeableness—suavity, ability to conform, and to be in sympathy with those about one.

Dr. J. R. Buchanan has taught since 1842 the doctrine contained in his "System of Anthropology" (Cincinnati, 1854), which departs in many particulars from the received system; especially in greatly increasing the number of faculties by subdividing the brain, and in recognizing and claiming to localize, by the aid of certain assumed principles of impressibility, and chiefly in the under surfaces of the brain, faculties antagonistic to nearly or quite all those which may be termed the useful or noble; thus admitting regions of vice and crime, as well as of virtue and excellence. Dr. Carus of Dresden published a "New Cranioscopy" (Stuttgart, 1841), in which he divides the brain into a small number of regions, rather than into organs. Among those in the United States who have become known for the advocacy or the popularizing of phrenological principles, should also be mentioned Mr. J. S. Grimes, and Mr. Nelson Sizer, since 1849 connected with the Fowlers and S. R. Wells as a practical examiner, and contributor to the "Phrenological Journal," who has also written several works on the subject.—Confirmation of the Gallian system has been sought in the examination of crania of noted characters and of criminals, as well as of the skulls of animals; and extensive collections of these and other specimens have been made. That of Dr. Gall contained of human crania, &c., 354; the Edinburgh museum has 463 natural specimens, and 380 artificial, the former including crania of various nations. Mr. Deville of London accumulated 5,450 pieces, 2,450 human specimens and 3,000 crania of animals; among the former were many of persons of peculiar character. (Edinburgh "Phrenological Journal," vol. xiv., p. 32.) The remark last made applies also to the collection of the late firm of Fowler and Wells of New York, numbering about 4,000 pieces, including about 300 human skulls, 200 of animals, 500 casts or busts, and 3,000 portraits and drawings. Dr. Vimont of Paris accompanied his memoir for the French institute (1827), among other specimens, with 2,500 crania of animals, of 1,500 of which he had studied the habits. Dr. S. G. Morton of Philadelphia had collected in 1841 more than 1,000 crania, more than half of which were human, of many nations. Prof. Ferrier of King's college, London, has recently (1873) made some brilliant experiments upon the brains of cats, dogs, and other animals. The animal is put under the influence of chloroform, the skull is removed, and the brain exposed. He then applies the point of an electrode to the convolutions of the brain. Its effect is to excite the functional activity of that part, and thereby to show what its real work is. It is supposed that this discovery will effect a revolution in the old physiology of the brain, and that the announcements of Gall and Spurzheim as to the functions of special parts of the brain may be verified. One of the chief results obtained by Dr. Ferrier is the belief that each convolution is a separate organ, although occasionally several may be conjoined for common work. He also finds that the great motion centres are situated in the front part of the brain. The result demonstrates that the nerves moving the muscles of the jaw are just above the ear, where the phrenologists place gustativeness. The royal society has voted a grant to Dr. Ferrier to carry out his experiments on monkeys.—See Spurzheim, "The Physiognomical System of D. Gall and Spurzheim" (London, 1815), "Outlines of the Physiognomical System" (1815), and "View of the Elementary Principles of Education" (Edinburgh, 1821); Gall, *Anatomie et physiologie du système nerveux* (2d ed., 6 vols., Paris, 1822-'5); George Combe, "Elements of Phrenology" (Boston, 1835), and "Lectures on Phrenology" (1836); O. S. Fowler, "Memory and Intellectual Improvement" (New York, 1841), "Hereditary Descent" (1843), and "Practical Phrenology" (1846); Laycock, "Mind and Brain" (2 vols., Edinburgh, 1860); Alexander Bain, "On the Study of Character, including an Estimate of Phrenology" (1861); and S. R. Wells, "Wedlock, or the Right Relation of the Sexes" (New York, 1869).

PHRYGIA, in ancient geography, a division of Asia Minor, whose boundaries varied materially at different periods. It was situated west of the river Halys, and surrounded by Bithynia, Paphlagonia, Cappadocia, Lycaonia, Pisidia, Lycia, Caria, Lydia, and Mysia. It was also called Greater Phrygia to distinguish it from a territory S. of the Propontis in later times included in Mysia, which was known as Lesser Phrygia. After the invasion of the Gauls in the 3d century B. C., its northeastern portion formed the main part of Gallo-Græcia or Galatia. (See Galatia.) In the early Roman period there was no special province of Phrygia, but the territory at different times was variously apportioned to other provinces. The bulk of it was included in the kingdom of Pergamus, and subsequently in the province of Asia. In the 4th century A. D. the Romans added the southern portion of Phrygia, surnamed Parorius, to the province of Pisidia, another district to Caria, and formed of the remaining portions two provinces, calling the eastern Phrygia Salutaris and the western Phrygia Pacatiana. Most of the larger cities were in the southwest; the most important were Celænæ, at the source of the Mæander; Apamea Cibotus, founded by Antiochus Soter;

Colossæ, where a Christian church was established; Laodicea, the seat of another Christian church; Hierapolis, renowned for its mineral springs; and nearer the centre of the province Docimeum, the marble of which was in high repute. The principal rivers were the Mæander in the west and the Sangarius on the N. boundary. The country is a high table land, the soil in the north and west being fertile, but covered with salt marshes and lakes in the south. It was celebrated for its wool, agricultural produce, cheese, and salt provisions.—The Phrygians were regarded as one of the most ancient nations of Asia Minor; according to some, including Herodotus, they were Thracians; according to others, Armenians. The few linguistic remains point to an Iranian origin, though bearing some resemblance to Greek. Among them is the epitaph of a king Midas, possibly a descendant of the legendary Phrygian king Midas who turned everything he touched into gold. Though little of their history is known, the Phrygians were to all appearance a nation of considerable power and culture. The Phrygian religion was noted for the frenzied dances and self-mutilations of the priests and devotees. In early times they seem to have been governed by kings of their own. They were conquered by Crœsus, king of Lydia, and along with the rest of his dominions became a part of the Persian empire. After the conquest and death of Alexander it belonged to the empire of the Seleucidæ. A rich portion of it, S. of the Sangarius, was annexed by Bithynia, but subsequently given by the Romans to Pergamus under the name of Phrygia Epictetus. The main parts of Phrygia are now embraced in the Turkish vilayet of Khodavendighiar.

PHRYNE, an Athenian *hetaira* or courtesan, of the latter part of the 4th century B. C., born in Thespiæ, Bœotia. She was of very humble birth, and at first was employed in gathering capers; but her transcendent beauty attracting rich admirers, she acquired so much wealth that, after Alexander destroyed the walls of Thebes, she offered to rebuild them, if she could be permitted to put up the following inscription: "Alexander destroyed them, but Phryne the courtesan rebuilt them." Among her lovers were some of the most distinguished men of the age. Being accused of profaning the mysteries of Eleusis, she was brought before the court of the heliasts, when the orator Hyperides, perceiving that his eloquence would fail, secured her triumphant acquittal by unveiling her bosom before the judges. Praxiteles modelled from her the Cnidian Venus, and the picture of Apelles called "Venus Anadyomene" is said to have been taken from Phryne.

PHTHIOTIS (Gr. *Φθιῶτις*), the southernmost district of ancient Thessaly. It extended from Dolopia and the S. E. portion of the Pindus range on the west to the Pagasæan gulf on the east, and from the Narthacian mountains, near Pharsalus, on the north, to the Maliac gulf on the south. The Othrys range passed through its central part. It derived its name from the Phthia of the Homeric poems, a country of much larger extent apparently than the subsequent district, for it is represented as including Hellas and Dolopia as well as the region about Pharsalus. Phthiotis was inhabited by Achæans. The chief towns of the district were Thebes (Thebæ Pthiotides), Halus, Pteleum, Antron, Larissa, Lamia, Xyniæ (near Xynias lake), Thaumaci, and Itonus.—The modern Greek nomarchy of Phthiotis and Phocis, having Phthiotis for its northernmost eparchy, includes only the southern portion of the ancient district, its northern boundary extending along the Othrys range. The area of the nomarchy is 2,053 sq. m.; pop. in 1870, 108,421. Capital, Lamia or Zeitun.

PHTHISIS. See CONSUMPTION.

PHTHIRIASIS. See EPIZOA, vol. vi., p. 696.

PHYLACTERY (Gr. *φυλακτήριον*, from *φυλάσσειν*, to guard), a name given to any amulet or charm worn by the ancients to guard them against danger and disease, or, as among the Hebrews, against transgression. Among the latter it was a strip of parchment, upon which were written passages from the Scriptures, and which, folded up and placed in a small leather box, was worn by the devout principally on the forehead. Among orthodox modern Jews, they are attached to the head and to the left arm, but worn only during morning prayers, and only on work days. They are known as *tephillin* (from *tephillah*, prayer), and as such distinguished from similar marks of warning attached to the door posts, and from the latter called *mezuzoth*. Very fine vellum is employed, and the writing traced with great care, while the case in which they are enclosed is made of several layers of parchment or of black calfskin.—Among the early Christians, a phylactery was often used as an amulet, a practice forbidden by the council of Laodicea.

PHYLLOXERA (Gr. *φύλλον*, a leaf, and *ξηρός*, parched), a word coined in 1834 by a French entomologist, Fonscolombe, to designate a genus of plant lice, founded on the *phylloxera quercus*, a species living on the under side of oak leaves in Europe, and causing them to wear a withered appearance. The genus is more particularly distinguished structurally by having three-jointed antennæ, the terminal joint longest, by the simple venation of the wings, and by the wings when at rest being folded flat upon the back. It is also peculiar from occupying an osculant position between two great families, the plant lice (*aphidæ*) and the bark lice (*coccidæ*), agreeing in some respects with the insects of the latter, but in most of its affinities being decidedly aphidian. The genus, though discovered in Europe, has its greatest representation in America; for while there are but two or three discovered species indigenous to that continent, all occurring on oak, there are 16 described species in America, most of them inhabiting galls upon the leaves and twigs of different species of hickory (*carya*), one inhabiting the grape vine, and one only, on oak (*phylloxera Rileyi*), being an external feeder. None of these species except that on the grape vine seriously affect man's interests.—In 1865 a disease of grape vines in the vineyards of France began to attract general attention. It was first noticed in the lower valley of the Rhône, a little above Avignon, upon the plateau of Pujault, department of Gard. In 1866 the disease had not only spread north of Avignon, but was observed at different localities in the S. part of the department of Bouches-du-Rhône. In 1867 it continued to spread and to gain in intensity, and in 1868 the whole of the country along the left bank of the Rhône, from its mouth to the environs of Donzère, was infected. In 1869 the disease became still more alarming, the older seats enlarging and coalescing, and many new points of attack becoming known in the departments of Hérault and Var. It now attracted universal attention, and investigation of it was stimulated by a large government reward for a remedy. It continued to spread, though with diminished virulence, and at the close of 1874 it occupied more or less the whole area of the lower Rhône from Valence to the mouth, and from Montpellier to Toulouse; around Bordeaux, on the right bank of the Gironde; around Cognac in the north, and Lyons in the east. The government offers a standing premium of 300,000 francs for an efficient remedy, and the national academy of science puts forth untiring efforts to study the disease in all its features. It has already been found in restricted localities in Spain, Portugal, Switzerland, Austria, and Prussia, either on American vines or in neighborhoods where such vines have been planted. The authorities in most of these countries, as well as in Australia, have prohibited the importation of American vines into unaffected districts. One of the most marked features of the disease is the rotting and wasting of the roots. In 1868 Prof. J. E. Planchon of Montpellier discovered the real cause in a minute plant louse working upon the root. This insect, though it had previously been described in its apterous form under three different generic names, was finally referred to its proper genus and named *phylloxera vastatrix* by Planchon. Since then the term phylloxera has acquired a somewhat broader meaning than it at first conveyed; it now designates not only the genus of insects, but the disease in question. In 1869 M. J. Lichtenstein of Montpellier first suggested that the phylloxera which was devastating the vineyards of France might be the same as a species described as *pemphigus vitifoliæ* by Dr. Fitch, and known to make galls on the leaf of the grape vine in America. Following up this suggestion, Prof. C. V. Riley of St. Louis established the specific identity of the two insects in 1870, not only by careful comparisons, but by showing that the gall-inhabiting insects hibernate on the roots, and there acquire all the characteristics of the root-inhabiting individuals. This last fact was also independently proved by European observers during the same year, and the specific identity of the types inhabiting leaves and roots has since been thoroughly established by careful anatomical study as well as by experiments. In 1871 Prof. Riley discovered that the roots of vines in America are attacked by the insect in the same manner as are those of Europe. In the autumn of that year he announced this discovery, and, in the fourth entomological report of the state of Missouri, gave every reason to believe that the failure of the European vine (*vitis vinifera*), when planted in America east of the Rocky mountains, the partial failure of many hybrids with the European *vinifera*, and the deterioration and death of many of the more tender-

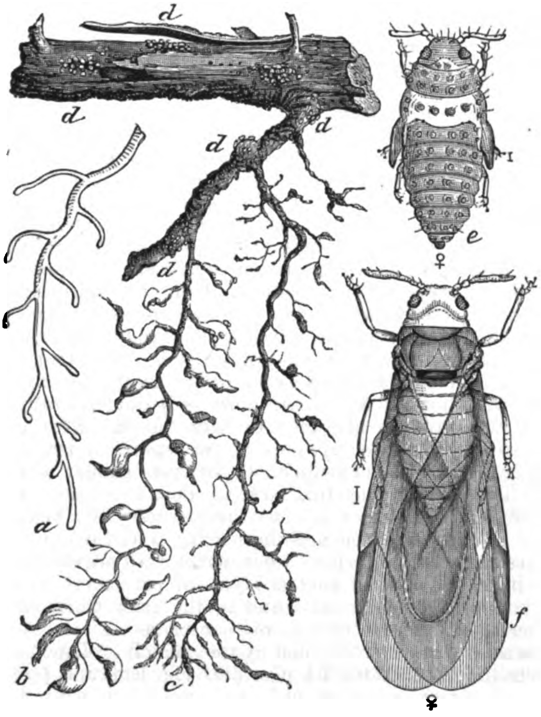


Fig. 1.—Phylloxera, Type Radicicola.

a. Healthy root. *b*. Root on which the lice are working, showing the knots and swellings caused by their punctures. *c*. Root deserted by them, on which the rootlets have begun to decay. *d d d*. Lice on the larger roots, natural size. *e*. Female pupa, dorsal view. *f*. Winged female, dorsal view, greatly enlarged.

rooted native varieties, are mainly owing to this insect. He also showed that some of our native varieties enjoy relative immunity from its attacks.

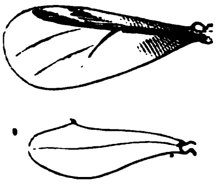


FIG. 2.—Upper and Under Wings of Phylloxera.

In 1878 Prof. J. E. Planchon was commissioned by the French government to visit America to study the phylloxera. His investigations corroborated Prof. Riley's conclusions as to the identity of the American and European insects, and the relative immunity of some of the American vines. His official reports of this visit have done much to dispel some of the prejudice existing among his countrymen in regard to American vines, and still more to create a large demand for such American vines as resist the insect, to be used as stocks on which to graft the French vines.

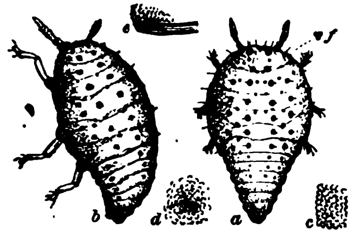


FIG. 3.—Type Radicicola.
a, b. Wingless mother lice, back and side views. *c.* Granulations of skin. *d.* Tubercle. *e.* Transverse folds at border of joints. *f.* Simple eyes. Natural size indicated at side.

—The grape phylloxera is indigenous to the North American continent east of the Rocky mountains, and is found from Canada to Florida on the wild vines of the woods, and on the cultivated vines in most and probably all of the states. It presents itself in two different types. That which makes galls on the leaves is called *gallicola;* it is smooth and very prolific, and exists only as an agamous wingless female. It is quite transient, abundant one year and unseen the next, and seems to be unessential to the perpetuation of the species; an abnormal deviation from the root-inhabiting type, rendered possible under certain conditions.

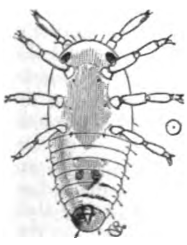


FIG. 4.—Male Phylloxera, ventral view. Natural size indicated by dot in circle.

The root insect, distinguished as *radicicola*, though precisely like the gall-making type when first hatched, subsequently acquires tubercles. The grape phylloxera hibernates mostly as a young larva torpidly attached to the roots, and so deepened in color as generally to be of a dull, brassy brown, and therefore with difficulty perceived, as the roots are often of the same color.

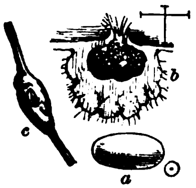


FIG. 5.—Type Gallicola.
a. Egg. *b.* Section of gall *c.* Swelling of tendril.

With the renewal of vine growth in the spring this larva moults, rapidly increases in size, and soon commences laying eggs. These eggs in due time give birth to young, which soon become virginal, egg-laying mothers, like the first, and like them always remain wingless. Five or six generations of these parthenogenetic, egg-bearing, apterous mothers follow each other, and then, about the middle of July in the latitude of St. Louis, some of the individuals begin to acquire wings. These are all females, and like the wingless mothers they are parthenogenetic. Having issued from the ground while in the pupa state, they rise in the air, and spread to new vineyards, where they deliver themselves of their issue in the form of eggs or egg-like bodies, usually two or three in number, and not exceeding eight, and then perish. It is not yet positively known where these winged females prefer to lay their eggs; but experiment indicates that while the eggs may be pushed into the tomentose buds, they are most probably laid as a rule in the minute crevices on the surface of the ground, near the base of the vine. These eggs are of two sizes, the larger about 0·02 of an inch long and the smaller about three fifths of that length. In the course of a fortnight they produce the sexual individuals, the larger ones giving birth to females, the smaller to males. These sexual individuals are born for no other purpose than the reproduction of their kind, and are without means of flight or of taking food or excreting. They are quite active, and couple readily. The abdomen of the female, after impregnation, enlarges somewhat, and she is soon delivered of a solitary egg, which differs from the ordinary eggs of the parthenogenetic mothers only in becoming somewhat darker. This impregnated egg gives birth to a young louse, which becomes a virginal, egg-bearing, wingless mother, and thus recommences the cycle of the species' evolution.

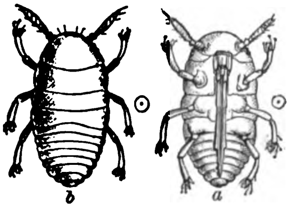


FIG. 6.—Type Gallicola.
a, b. Newly hatched larva, ventral and dorsal view. Natural sizes in circles at sides.

But a very important discovery made by Balbiani is that during the latter part of the season many of the wingless, hypogean mothers perform the very same function as the winged ones; *i. e.*, they lay a few eggs, which are of two sizes, and which produce males and females, organized and constructed precisely as those born of the winged females, and like them producing the solitary impregnated egg. We have therefore the spectacle of an underground insect possessing the power of continued existence, even when confined to its subterranean retreats. It spreads in the wingless state from vine to vine, and from vineyard to vineyard, when these are adjacent, either through passages in the ground itself or over the surface. At the same time it is able, in the winged condition, to emigrate to much more distant points. The winged females begin to appear in July, and continue to issue from the ground until vine growth ceases. They are much more abundant in August than during any other month, and on certain days literally swarm. Every piece of root a few inches long and having rootlets, if taken from an infested vine at this season, will present a number of pupæ; and an ordinary quart preserve jar, filled with such roots and tightly closed, will furnish daily for two or three weeks a dozen or more of the winged females, which gather on the side of the jar toward the light. Occasionally individuals under certain conditions abandon their normal underground habit, and form galls upon the leaves of certain varieties of grape vine. No species of vine is entirely exempt from the attacks of the insect in one form or another; yet many indigenous American vines resist its attacks so far that they are never seriously affected. The gall lice are found on all species, but least on the European vine (*vitis vinifera*) and most on the river bank grape (best known as *cordifolia*), and especially on the Clinton and Taylor. The root lice are most injurious to the European vine, and least so to our summer grape (*V. æstivalis*) and the scuppernong (*V. vulpina*), on the roots of which last it has not yet been discovered. The most susceptible native varieties, such as Catawba, Iona, Delaware, and Goethe, belong to the northern fox (*V. labrusca*).—Just as the puncture of the gall louse causes an abnormal swelling of the leaf, so that of the root louse causes knots and swellings on the roots. These swellings, which generally begin at the tips of the rootlets, where there is excess of plasmatic and albuminous matter, eventually rot, and the lice betake themselves to fresh ones; the living tissue being necessary to the existence of this as of all plant lice. During the first year of attack there are scarcely any outward manifestations of disease, though the fibrous roots, if examined, will be found covered with nodosities, particularly in the latter part of the growing season. The disease is then in its incipient stage. The second year all these fibrous roots vanish, and the lice not only prevent the formation of new ones, but settle on the larger roots, which also eventually become disorganized and rot. At this stage the outward symptoms of the disease first become manifest, in a sickly, yellowish appearance of the leaf, and a reduced growth of cane; and about the third year the vine dies. When the vine is about dying it is generally impossible to discover the cause of the death, the lice, which had been so numerous the first and second years of invasion, having left for fresh pasturage. The phylloxera is attacked by several enemies, few of which, however, reach it below ground. A host of remedies have been tried, but, with the exception of submersion and the use of sand and fertilizers, especially those rich in alkali, few are available in practical experience. —See Prof. Riley's sixth annual "Report on the Insects of Missouri" (1874).

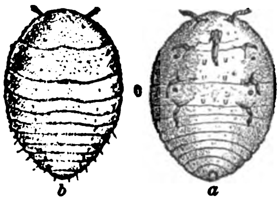


FIG. 7.—Type Gallicola.
a, *b*. Mother gall louse, dorsal and ventral views. Natural size indicated between them.

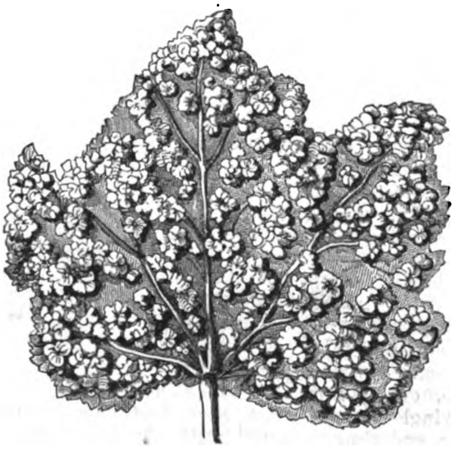
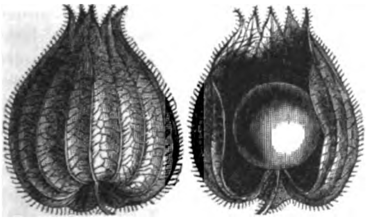


FIG. 8.—Under Side of Leaf covered with Galls.

PHYSALIS (Gr. φυσαλίς, a bladder, in reference to the inflated calyx), a genus of annual and perennial herbs, of the *solanaceæ* or nightshade family, comprising about 50 species, several of which are North American and two or three cultivated in gardens. Those in cultivation, though having perennial rootstocks, are treated as annuals; they have branched spreading stems, which with the triangular or somewhat heart-shaped leaves are viscid-hairy; the solitary flowers are nodding on extra-axillary peduncles, with a five-cleft calyx, and a greenish white or yellowish corolla, between wheel-shaped and funnel-formed; five erect stamens, and a two-celled ovary, which when ripe becomes a two-celled, juicy, edible berry; after flowering and during the development of the fruit, the calyx grows very rapidly, and at maturity is thin, five-angled, much netted, and completely envelops the fruit in a balloon-shaped covering much larger than itself. The species most generally cultivated in this country is *P. Peruviana* (*P. edulis* and *P. esculenta* of some authors), which is known as strawberry tomato, ground and winter cherry, and yellow alkekengi; in England it is called Cape gooseberry, and by the French *cerise d'hiver* and *cerise de Juif*. Its specific name indicates its native country. Its pale yellow flowers are spotted with purple; the fruit is about half an inch in diameter, yellowish or amber-colored, and semi-transparent at maturity, the calyx becoming a dull yellowish or light drab color. The berries enclosed in the calyx fall as soon as full grown, and do not usually reach complete ripeness until they have been kept for some days; they have a decided fruity flavor, something like that of the strawberry, though the after taste is not so pleasant; if spread thinly and kept from freezing, they retain their qualities through the winter; preserved with sugar with the addition of lemon juice, they make an acceptable sweetmeat. The cultivation is the same as that for the tomato; the plants come up abundantly from self-sown seed, and it is disposed to be a weed. The alkekengi (from the Arabic, *P. alkekengi*), from the south of Europe, has smoother leaves than the preceding, greenish white unspotted flowers, a brilliant scarlet berry, and the husk or enclosing calyx of the same color, rendering the plant quite ornamental; the fruit has similar qualities to the preceding, but it is very much less cultivated in gardens. The calyx of both species is used in making skeleton bouquets, the cellular tissue being séparated by macerating and leaving only the network of fibres. The native *P. Philadelphica* is nearly smooth, with an erect stem and yellowish flowers which are dark colored in the centre, and has a globose calyx completely filled by a dark purple berry an inch in diameter; it is abundant in some southern and western localities, and is sometimes cultivated as the purple alkekengi, purple strawberry tomato, &c., for its fruit, which is used for preserving.

Winter Cherry (Physalis Peruviana)—Flower and Leaves.



Fruiting Calyx, and Calyx opened.

PHYSICAL GEOGRAPHY, that department of the science of geography which treats of the physical condition of the earth, describing its character and relations as a member of the solar system, explaining its great natural divisions of land and water, the atmosphere, and the great movements, as of oceanic and aërial currents, which variously affect and modify these features. The forms of continents and oceans and of their subdivisions, the heights and ranges of mountains, the phenomena of deserts and plains, and all the varying outlines from the highest mountain summits to the lowest depths of the sea, are among the first objects of its consideration. The geological structure of the earth and all meteorological phenomena belong to the broad field of its investigations; which also comprises the natural products of the earth, vegetable and animal. But comprehensive as is its range, it does not enter into individual descriptions of phenomena, localities, and species, but is concerned chiefly with general laws and principles, as they are manifested upon a grand scale, and in the organic kingdom with the existence of races and their distribution in certain zones or stations of habitation. The relations and adaptations of organic and inorganic nature to each other are specially treated in this science alone. Its ultimate aim, as stated by Humboldt in his "Cosmos," the work which first gave to physical geography a special place among the sciences, "is to recognize unity in the vast diversity of phenomena, and by the exercise of thought and the combination of observations to discern the constancy of phenomena in the midst of apparent changes."—The first writers on physical geography were among the earliest geographers and writers on physical science, and have been referred to in the articles EARTH and GEOLOGY. The broad views advanced by Thales, Pythagoras, Aristotle, Strabo, Pliny, and others of the ancient philosophers and geographers, entitle them to be regarded as the first cultivators of this science. In modern times its principles have been treated with great originality and ability by the Jesuit José de Acosta, in his *Historia natural y moral de las Indias* (Madrid, 1590). In 1650 was published the first edition of the work of Varenius, entitled *Geographia Generalis, in qua Affectiones Generales Telluris explicantur*, which Humboldt says, "in the true sense of the words, is a physical description of the earth." A part of this is styled *Geographia Comparativa*, which is the term now generally applied to works on physical geography; and the leading subjects discussed are those of the most recent treatises. The great advance made of late years in the auxiliary sciences furnished materials for more extended generalizations and a more complete delineation of comparative geography, which was treated in all its relations with the history of man by Karl Ritter in *Die Erdkunde im Verhältnisse zur Natur und zur Geschichte des Menschen* (2d ed., 19 vols., Berlin, 1822–'59). The principles of the science are ably illustrated in the "Physical Atlas" of Alexander Keith Johnston, first published in 1848; and they are expounded, among others, in the writings of Sir John Herschel, Mrs. Somerville, Arnold Guyot, M. F. and A. Maury, Reclus, and numerous other physicists. In this Cyclopædia the topics more or less closely connected with physical geography are treated under their separate heads, as Clouds, Dew, Earthquake, Hail, Hurricane, Mountain, Tides, and Volcano, as well as under the more general heads of Climate, Earth, Geology, Meteorology, &c.

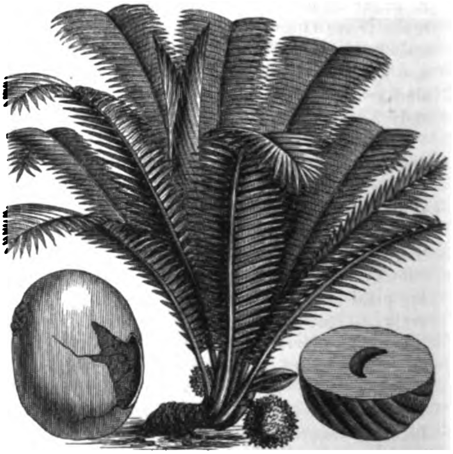
PHYSICK, Philip Syng, an American physician and surgeon, born in Philadelphia, July 7, 1768, died there, Dec. 15, 1837. He graduated at the university of Pennsylvania in 1785, studied medicine, and in 1788 went to London, where he became the private pupil of John Hunter. In 1790 he was admitted as house surgeon to St. George's hospital, and on leaving it received his diploma from the royal college of surgeons in London. He returned to Philadelphia in 1792, and in 1793, on the outbreak of the epidemic, was appointed physician to the yellow-fever hospital at Bush hill. In 1805 he was appointed professor of surgery in the university of Pennsylvania, in 1819 was transferred to the chair of anatomy, and in 1824 was elected president of the Philadelphia medical society. He wrote for medical journals accounts of cases he had treated, or of processes or instruments he had invented. He has been called the father of American surgery.

PHYSICS. See Natural Philosophy.

PHYSIOGNOMY (Gr. *φυσιογνωμονία*, from *φύσις*, nature, and *γιγνώσκειν*, to know), the art or science of reading human nature by means of the face, which is hence called the physiognomy. It is certain that physiognomy was cultivated in ancient Egypt and India, and the present recognition of it by the Chinese as evidence in courts of justice is said by them to have descended from remote antiquity. The oldest extant scientific writings on the subject are those of Aristotle. In his "Treatise on Physiognomy" he refers to the labors of predecessors in the same field; and his "History of Animals" is almost as much a system of comparative physiognomy as of comparative anatomy. One of Aristotle's greatest disciples and followers, in physiognomy as well as in natural history and botany, was Theophrastus; his "Characters" contains 30 chapters with 50 physiognomical sketches. Polemo, shortly after him, also paid great attention to the science; his work on it is contained in the *Scriptores Physiognomiæ*, with those of Adamantius, Giovanni Ingegneri, and others. Albertus Magnus, in the 13th century, wrote learnedly on physiognomy, and published a chart of the Aristotelian division of the mental faculties in connection with the lobes of the brain, as did also Pietro Montagnana in 1491. Gall makes the latter the basis of his classification and location of faculties and organs in his treatise *Sur les fonctions du cerveau* (Paris, 1822–'5). The celebrated work of Giambattista della Porta on physiognomy (Naples, 1586) compares men with animals, placing them side by side, and is to a great extent a commentary on Aristotle. Cardan, Spontanus, Tommaso Campanella, and many others, contributed to this science by their writings and their zeal. Dr. Parsons, in the "Philosophical Transactions" for 1749, gives a list of 41 old authors who have written on expression. Le Brun, father of the French school of painting, was scarcely less distinguished as a physiognomist than as a painter. His treatises *Sur la physiognomie* and *Sur le caractère*, says a biographer, "were the chief authority in academies and with teachers," and he "was long regarded as the great model and authority in expression." He compares men and animals with each other, after the manner of Porta; and Tischbein, a German painter, carries out the same idea in his *Têtes des différents animaux dessinées d'après nature* (Naples, 1796). Lavater began his study of faces when a boy, his collection of portraits of remarkable men of all ages and countries in 1769, and his publications on the subject in 1772, these being followed in 1775–'8 by his *Physiognomische Fragmente*. Camper, the Dutch anatomist, who published "Discourse on the Face," "Analogy between the Structure of the Human Body and that of Quadrupeds," and "Connection between the Science of Anatomy and the Arts of Drawing, Painting, and Statuary," shortly after the publications of Lavater, was almost lost in the popularity of his predecessor; and his only really valuable contribution to physiognomy that has lived is his "facial angle," the incipiency of which he ascribes to the sages and artists of ancient Greece. A new physiognomical era begins with Dr. Gall. Lavater began his studies with observations on the forehead; Gall began his with speculations on the eyes of his fellow students, followed by studies of the interocular space and the frontal sinus, discovering in them words and the revelations of words, and the senses of form and place. Gall starts with the idea of elementary faculties of the mind, and of a distinct organ for each faculty, in and through which it exists and manifests itself. His system combines the old ideas of metaphysics, physiology, and physiognomy in the unitary circle of cause, means, and end. A most valuable contribution to physiognomy, contemporary with that of Gall, is Johann Gottfried Schadow's "Groups of Mankind according to their Races and Periods" (1824), followed by his "National Physiognomies" (1835). In the chevalier de Gama Machado's "Theory of Resemblances, a Philosophical Essay on the means of determining the natural Dispositions and Habits of Animals, according to the Analogies of their Forms and the Colors of their Coats" (1831), the author extends his comparisons to resemblances between animals and plants, illustrating them by colored engravings. Sir Charles Bell ("Anatomy of Expression," 1806; revised ed., 1844) says: "Attending merely to the evidence furnished by anatomical investigation, all that I shall venture to affirm is this, that a remarkable difference is to be found between the anatomy and range of expression in man and in animals; that in the former there seems to be a systematic provision for that mode of communication and that natural language which is to be read in the changes of the countenance; that there is no emotion in the mind which has not its appropriate signs; and that there are even muscles in the human face to which no other use can be assigned than to serve as the organs of this language; that, on the other hand, there is in the lower animals no range of expression which is not fairly referable to a mere accessory to the voluntary or needful actions of the animal; and that this accessory expression does not appear to be in any degree commensurate to the variety and extent of the animal's passions." Spurzheim's "Physiognomy in connection with Phrenology," containing numerous portraits of historical personages, proceeds upon the supposition that there are no exact signs of character in the face except what can be seen in the forehead. An idea of reciprocal relation between the brain and the face in the manifestation of character led Dr. J. W. Redfield in 1840 to the observation of signs of character in the face corresponding with those of Gall and Spurzheim in the brain. According to him, the lower jaw answers to the cerebellum, and the rest of the face to the cerebrum; the upper jaw bone to the posterior lobe, the cheek bone to the middle lobe, the nasal bones and the cartilage to the anterior lobe, the muscles about the mouth to the crown of the head, and those of the eye and forehead to the coronal region; the difference between the brain and face in these corresponding divisions being this: that the brain is the organ of the endurance or responsible impressibility of the mind, and that the face indicates its voluntariness or motive action, as shown in the predominant brain and impressibility of the child, and the predominant face and purpose of the adult. Observing these relations between the brain and the face, he finds the "amativeness" of the cerebellum in the chin; the "philoprogenitiveness" of the posterior lobe of the cerebrum in the first pair of upper incisors; the "cunning" of the middle lobe in the zygomatic arch of the cheek bone: the "comparison" of the anterior lobe in the end of the nose; the "self-esteem" and "approbativeness" of the crown of the head in certain muscles of the upper lip; the "conscientiousness" and "benevolence" of the coronal region in certain muscles of the forehead; and in like manner the other regions of the brain in corresponding faculties in the face. The facial signs of these are described in his "Outlines of a New System of Physiognomy" (1848), and in his plaster chart of the face (1850), published in S. R. Wells's work on "Physiognomy" in 1866. His first number of "The Twelve Qualities of Mind" was published in 1850, and his "Comparative Physiognomy, or Resemblances between Men and Animals," in 1858. The discoveries of Dr. Duchenne are to a remarkable degree confirmatory of Dr. Redfield's, published 14 years before. Darwin, in his "Expression of the Emotions in Men and Animals" (1872), renders invaluable service to physiognomy by comparisons of physiognomical expressions extended to the most distantly related of the human family, and to the most familiar but least investigated habits of the animals around us.

PHYSIOLOGY (Gr. φύσις, nature, and λόγος, discourse), strictly speaking, the doctrine of nature, embracing a knowledge of all the physical and natural sciences, but now restricted to the science which treats of the vital phenomena of organized bodies, whether animal or vegetable. It does not include, as a rule, the phenomena of diseased action, which belong to the separate department of pathology. General physiology treats of the vital phenomena as manifested in the organic kingdom as a whole, not as restricted to particular species; as, for instance, the influence of light on animal and vegetable growth, the question of spontaneous and sexual generation, and the duration of life, as compared with the organization and fecundity of the individual. Comparative physiology shows the points of resemblance and diversity in the vital actions of various groups and species more or less related to each other. Special physiology gives the details of the vital phenomena in particular species, such as the kind and quantity of food consumed, the number of young produced at a birth, the frequency and volume of the respirations, and the daily quantity and composition of the secreted and excreted fluids. Human physiology, as a special branch, is of course confined to the vital operations in the human species; but it is evident that the facts relating to a particular species cannot be fully appreciated, nor even understood, without an acquaintance with general physiology; for it is only in this way that we can determine whether a given phenomenon is dependent on the special organization of that particular species, or one common to all animal and vegetable forms alike. A complete knowledge of anatomy, down to the minutest structures of microscopic forms, is also a necessary preliminary to the successful study of physiology; and the same thing may be said of organic chemistry, so far as it relates to the immediate composition of the animal solids and fluids. Since many of the phenomena of living beings are physical or chemical, a sufficient knowledge of physics and inorganic chemistry is also indispensable in physiological pursuits.—Living beings may be distinguished from inorganic matter by the peculiar arrangement of their heterogeneous parts, solid and fluid, mutually acting upon each other, by their definite form, and determinate bulk; by their origin from parents in the form of germs; by their powers of drawing sustenance from the external world, of excretion, and nutrition; and by the fact that they exhibit a definite term of existence, through which they pass by successive periods or phases of growth and decay. In eggs and seeds the vital properties exist, though in a dormant state. Even presupposing the existence of organized structure, it is impossible to give a precise definition of life. The ancients held to the opinion that there is an independent entity or vital principle, whose union with the body causes life and its separation from it death. The moderns, having found that the study of this intangible vital principle does not lead to any definite result, have abandoned its pursuit and even the discussion as to its existence, and have devoted themselves to the investigation of the natural phenomena of living bodies, so far as they are appreciable by the human senses and intelligence. With them, therefore, the study of life is simply the study of its phenomena, without any attempt to determine its actual nature. Various definitions of life, however, have been attempted. According to Bichat, "life is the sum total of the functions which resist death;" Treviranus makes it "the constant uniformity of phenomena with diversity of external influences;" and Béclard calls it "organization in action." The theories of the principle of life may be divided into three groups: 1, those which consider the body an inert mass, into which an animating principle, called by various names, has been introduced; 2, in which life is explained by physical laws; 3, which recognize special vital properties or a vital force. In the first belongs the ancient theory of animism, according to which the world is vivified by a soul or spirit everywhere diffused, a portion of which gives life to man, animals, and plants. The ancient philosophers compared the human microcosm to the macrocosm of the universe, and recognized the same motor forces for organic and inorganic matter. Hippocrates considered unintelligent nature as the mysterious agent in the vital processes. Plato and Aristotle admitted three animating spirits, the vegetative in the plant, the vegetative and sensitive in the animal, and in man an additional intelligent and reasoning spirit, nobler and purer than the others. Paracelsus, in the 16th century, pretended to explain the functions of life by chemical and cabalistic arts, attributing to sidereal spirits and the planets a direct action upon the body, the sun upon the heart, the moon upon the brain, &c. Van Helmont afterward personified the vital principle under the name of *archæus*, a name previously employed by Paracelsus; this power was situated at the cardiac orifice of the stomach, and presided directly over digestion by the agency of the gastric juice; the *pylorus*, another dignitary of the organism, the doorkeeper of the stomach, opened or shut the passage into the intestine under its control; this duumvirate had its subordinates in each organ, which executed the special orders; health reigned during the peaceful and orderly state of the *archæus*, but its anger, fright, or irregularity produced diseases—a notion under which we perceive the dimly shadowed idea of the sympathy and mutual dependence of organs now universally recognized. By the aid of a chemical ferment the *archæus* could organize matter directly, without the intervention of an egg. Stahl, early in the 18th century, though educated in the chemical school of physiology, found so many vital phenomena inexplicable by physical laws, that he sought for a new basis for the physiological edifice, insisting on the inertia of matter. Organization to him was nothing without the rational soul, at the same time that the latter could do nothing without the body which was created for it; all physiological acts were established and directed by the soul in order to preserve the integrity of the body, by which it is brought into relation with the external world; most of the functions were destined to prevent the decomposition of the soft solids and liquids of the body, and all the movements were voluntary. Descartes, early in the 17th century, put an end to the theory of Van Helmont's *archæi;* notwithstanding the immense power he attributed to the soul, this philosopher's theories led to the establishment of the chemical and mechanical schools of physiology; he favored the former by introducing ferments, acidity, alkalinity, and effervescence of the humors, among the nutritive functions; and he influenced the latter by explaining the secretions by the round, cubic, or pyramidal forms of the molecules, and the functions of relation by a vibratory movement excited in the nerves by external impressions, propagated to the pineal gland in the brain, and terminating in the cerebral fibres on which it left material traces. Sylvius of Leyden, in the last half of the 17th century, explained all the functions of the body by the effervescence and fermentation of the fluids, entirely excluding the solids from his physiological scheme; food fermented in the stomach under the influence of the gastric fluids, and digestion was perfected by the actions established by the addition of the bile and the pancreatic secretion; the movement of the blood in the heart was due to the effervescence arising from the meeting of an oily volatile salt of the bile with a saccharine acid of the lymph, producing at the same time the animal heat; the vital spirits, entirely material, were prepared in the brain by distillation, having much of the properties and nature of alcohol; all diseases were caused by the predominance of this or that chemical element in the fluids, and to counteract a supposed acidity very powerful chemical preparations were rashly administered. While Sylvius taught these doctrines upon the continent, Willis promulgated similar ones in Great Britain; he also made the chyle effervesce in the heart under the influence of salt and sulphur, which took fire together and produced the vital flame. According to Haller, even the great mind of Newton was led astray by such vagaries as these. Many of the popular ideas of peccant humors, for which a multitude of empirical remedies are continually extolled and exhibited, date back to the chemical theories of the 17th century. Boerhaave and his school, early in the 18th century, substituted mechanical for chemical forces in physiology, explaining the phenomena of life on the principles of mechanics and mathematics, according to the idea of Descartes. The then admitted doctrine of Harvey of the circulation of the blood and the discoveries of Galileo favored the progress of this school. Food was reduced in the stomach to minute particles by trituration; the circulation was a complete hydraulic machine, and the heart a perfect sucking and forcing pump; the weight of the blood and the loss of its motive power from friction in the vessels were exactly calculated, and the force of the heart's contraction estimated at 180,000 lbs.; the differences in the secretions were explained by the diameter, foldings, and number of the divisions of the vessels in the secreting organs, and by the diverse forms of the molecules, some of which were admitted and others excluded by these kinds of organic sieves; animal heat was the result of the friction of the blood globules against each other and against the walls of the minute vessels. Electricity was at one time considered the active agent of the vital functions, and certain analogies indeed favored this view; electricity dethroned the vital principle, and the barrier erected with so much labor between living and inorganic bodies was again thrown down. Glisson, in England, toward the middle of the 17th century, while the physical theories of life were in vogue, maintained the activity of matter, and that all the functions of life depend on a property of living animal substance which he calls irritability, entirely independent of physical or mechanical forces—all parts of the body, even the bones and the fluids, possessing this property. This theory was completely forgotten until toward the middle of the 18th century, when various authors made use of the terms contractile force and tonicity. Haller (1747) admitted two properties, irritability and sensibility (*vis insita* and *vis nervosa*). This irritability is the property of contracting under stimuli (the will for the ordinary muscles and their contents for the hollow ones), now styled contractility, distinct from and more powerful than elasticity, independent of the nervous force, and improperly called vital inasmuch as it is manifested after death. Sensibility is the power of perceiving the impressions derived from contact. This theory gave a great impulse to physiological science, which before this was in a very confused state. Barthez, in the last half of the 18th century, adopted the phrase vital principle, which he regarded as distinct from the soul, and as having its own proper existence and its motor and sensitive forces, the former residing in the muscles, the latter in the fluids and especially in the blood; this system met with great favor. Bichat, a quarter of a century later, reduced the vital properties to two, contractility and sensibility, each divided into the animal or voluntary and the organic or involuntary. Brown, a few years before this, had elevated the property of excitability in the tissues into the vital principle; according to him, all diseases are either sthenic or asthenic, the vital force being increased in the former and diminished in the latter; the doctrine gave rise to the contra-stimulant practice of Rasori and others. Blumenbach, toward the end of the 18th century, attributed all the formative actions to a force which he called *nisus formativus.* Broussais, early in the 19th century, made pathology a branch of physiology, and gave to his system the name of physiological doctrine of disease; his celebrated theory placed essential fevers among the inflammations of the digestive tube, as forms of gastro-enteritis. Gerdy admitted 17 vital principles, or so many distinct series of phenomena inexplicable by physical laws, a list which on his principles might be very greatly and inconveniently extended.—Modern physiology recognizes the fact that many of the phenomena presented by living bodies are purely physical or chemical, and are to be studied by precisely the same methods as any other physical or chemical phenomena. Such are the mechanism of the joints and the movements of the limbs upon the trunk; the extent, force, and rapidity of muscular contraction in general; the changes which take place in the food during digestion and in the air during respiration; the exhalation and imbibition of various matters by the blood vessels in the course of the circulation; the pressure and velocity of movement of the blood itself, and its changes of color and constitution. Not that these phenomena are exactly the same with those which are to be seen in the inorganic world; on the contrary, they are peculiar in their details, and can only be met with in living bodies, because there only are the necessary conditions for their production. But this peculiarity is merely one of detail, not of their essential character; consequently they are to be studied in the same way as similar phenomena elsewhere. The temperature of the blood is to be ascertained by the thermometer, like that of any other fluid; the gases absorbed and exhaled in respiration are to be analyzed and measured in the same way as if they came from any other source; but all these experiments and investigations, to be successful, must be performed upon the living body, since it is in the living body alone that the necessary conditions of the vital phenomena exist, even the simplest. On the other hand, there is a second division of the vital actions, in which the phenomena are apparently different from those of the inorganic world, and accordingly require to be studied in a peculiar manner; these are the phenomena of the nervous system, and consist of the various forms of sensibility, the motor stimulus, reflex action, and the sympathetic relation between various organs and parts of the body. It is evident, of course, that these phenomena also must be studied by observations made upon the body during life, or at least before the vitality of the nerves and nervous centres has disappeared.—The third and last division of the vital functions is perhaps the most peculiar of all, and the most widely removed from the phenomena presented by inorganic bodies; these are the actions which relate to reproduction or the generation of young individuals. These phenomena, unlike those of the first two divisions, do not relate to the preservation of the individual, but to that of the species. They consist of the appearance of a succession of different forms by which the embryo is developed into a perfect organization, and in which life is transmitted by an unbroken series of parents and progeny. Nothing similar to this is ever seen in the inorganic world, and accordingly the phenomena of this kind form the most striking characteristic of beings endowed with life.—The vital phenomena are also sometimes divided in a different manner, into those of vegetative and those of animal life. The vegetative functions are those which are common to both the animal and vegetable kingdoms, and include those relating to the internal nutrition and growth of the body and the reproduction of the species. All the physical and chemical changes going on in the blood and the tissues, secretion, the formation and elimination of excrementitious material, the production and growth of the egg and the embryo, and the changes in the body which show themselves at different periods of life, belong to the phenomena of this class. The animal functions consist in the phenomena of sensation, consciousness, intelligence, of voluntary or excited motion; all those in fact which bring the animal into relation with the external world through the operation of the nervous system.—The functions concerned in the vital processes are treated under Absorption, Abstinence, Adipose, Age, Aliment, Animal, Animal Electricity, Animal Heat, Bile, Blood, Bone, Brain, Capillary Vessels, Cartilage, Cell, Chyle, Chyme, Circulation, Comparative Anatomy, Dentition, Dietetics, Digestion, Embryology, Gland, Heart, Histology, Hunger, Kidney, Liver, Lungs, Lymph, Muscle, Nerve, Nervous System, Nutrition, Perspiration, Respiration, Secretion, Skin, Voice, &c. Besides the authors above named, reference may be made to the writings of Sir Charles Bell, Todd and Bowman, Carpenter, Magendie, Tiedemann and Gmelin, Burdach, Müller, Wagner, Virchow, Bérard, Flourens, Longet, Bernard, Robin, Brown-Séquard, and Milne-Edwards in Europe, and in America to those of Dunglison, Draper, Dalton, and Flint.

PHYTELEPHAS (Gr. *φυτόν*, a plant, and *ἐλέφας*, elephant), the botanical name of the genus which produces the ivory nut or vegetable ivory. It was formerly placed in the palm family; but as it differs essentially from the palms in the structure of the flowers, it now forms, with one other South American genus, a separate order, the *phytelephasieæ*. The genus contains two if not more species, the most important of which is *P. macrocarpa*, which furnishes the ivory nuts of commerce. The tree is found in the northern parts of South America, where on the banks of streams and in other damp localities it forms distinct groves, other trees, shrubs, or even herbs being hardly ever mixed with it. The proper stem creeps along the ground for 20 ft. or more, and then ascends, the upright portion being seldom over



Vegetable Ivory Tree (Phytelephas macrocarpa).

4 or 6 ft. high, and terminated by a crown of 12 or more pinnatifid leaves 18 to 20 ft. long. The flowers are diœcious, the male plant taller and more robust than the female, and its flowers in pendulous spikes 5 or 6 ft. long; the female flowers are in bundles of six or seven on short, thick, erect peduncles; both kinds emit a penetrating almond-like perfume, very attractive to bees. The fruit is a collection of six or seven drupes, each containing six to nine seeds; these drupes are aggregated in a mass something like a rounded cone, its exterior being formed of the crustaceous covering of the drupes, which is rough with woody protuberances. Each mass weighs about 25 lbs., and there are six or eight to each tree; these are called by the South Americans *cabezas de negro* or negro-heads. The ovoid nut is about as large as a hen's egg, with a blunt prominence at one side, showing the point of attachment, and often more or less flattened and angled by mutual compression; the testa, or outer covering of the seed, is hard and brittle, and within is the copious white, ivory-like albumen. In their early state the seeds are filled with a clear tasteless liquid, which after a time becomes milky and sweet, and gradually acquires greater consistency, until at length it is nearly as hard as ivory; during their softer stages swine, bears, turkeys, and other animals feed upon the seeds. The natives use the leaves of the plant to thatch their huts, eat the albumen while it is soft, and also value the sweetish oily pulp which surrounds the seeds within the drupe; but they make little or no use of the ripe nuts, which are exported in large quantities to England and the United States. A great many small articles of turnery are made from them, including cane heads, knobs, and buttons. Young specimens of the tree are much prized by collectors of palms and similar plants, as it is many years before the stem begins to become prostrate.

PIACENZA. I. A N. province of Italy, bordering on Pavia, Milan, Cremona, Parma, and Genoa; area, 965 sq. m.; pop. in 1872, 225,775. The S. part is mountainous; the N. part belongs to the plain of the Po, which river bounds it on the north. Wheat, maize, hay, chestnuts, wine, and excellent Parmesan cheese are produced in abundance. Among the minerals are iron, copper, and marble. The province formerly constituted the duchy of Piacenza, and was united with Parma. It is divided into the districts of Piacenza and Fiorenzuola. II. A city (anc. *Placentia*), capital of the province, on the right bank of the Po, 37 m. S. E. of Milan; pop. in 1872, 34,985. It has many churches and palaces, and is laid out in magnificent distances. It derives great strategical importance from its strong fortress. The original cathedral of the 4th century, repeatedly rebuilt, is now the church of Sant' Antonino, and the present cathedral dates from the 12th century. The churches Santa Maria, della Campagna, and others, were built after designs by Bramante; that of San Sisto once contained Raphael's celebrated Madonna of that name. One of the old churches is now used as a theatre, the Farnese palace as a barrack, and the Landi palace for courts of law. The Mandelli palace was long a ducal residence. Among the schools are a technical institute, a lyceum, a gymnasium, and the Gazzoli institute for instruction in drawing and for the gratuitous tuition of poor girls. The public library contains about 40,000 volumes. The principal manufactories are woollen and silk goods. About 8 m. S. of Piacenza is Velleia, called the Pompeii of northern Italy, a city which was overwhelmed by a land slide probably in the reign of Probus (A. D. 276–282), and was discovered in 1760.—Placentia became a Roman colony in 219 B. C., and the battle of the Trebia between Hannibal and Sempronius was fought here in the following year. Subsequently it withstood a protracted siege by Hasdrubal, but in 200 was captured by the Gauls. The Æmilian way originally terminated at Placentia. In the war between Marius and Sulla, M. Lucullus, the general of the latter, defeated the partisans of Carbo in 82 B. C. in its vicinity. Under the empire Placentia was a flourishing town of Gallia Cispadana. In 1126 it became an independent republic. In the 13th century it was subject to local dynasties, and subsequently to the Visconti of Milan, against whom it unsuccessfully revolted in 1447. The popes gained possession of Piacenza in 1512, after the battle of Ravenna, and through Paul III. it passed into the hands of his natural son Pietro Luigi Farnese along with Parma, of which it formed a part (see PARMA) till 1860, when both duchies were annexed to Victor Emanuel's dominions.

PIACENZA, Duke of. See LEBRUN, CHARLES FRANÇOIS.

PIANA DEI GRECI, a town of Sicily, in the province and 10 m. S. S. W. of the city of Palermo; pop. about 7,000. A settlement of Albanian refugees from Turkey was formed here in the latter part of the 15th century, the free exercise of their religion being guaranteed, and they still retain the Greek ritual, though acknowledging the pope. A few of the men still wear the fez, and most of the women preserve the picturesque Albanian costume. All of them speak chiefly Albanian, and live in Albanian fashion.

PIANOFORTE (Ital. *piano*, soft, and *forte*, loud), a musical instrument, the tones of which are elicited by the blows of small hammers upon a series of tightly stretched elastic steel strings; the hammers being caused, through certain connections, to rise upon the striking of the corresponding keys of a finger board, and the tones being strengthened and rendered melodious by the reciprocal vibrations of a sounding board, over and near to which the strings are stretched. In his history of the pianoforte, Dr. Rimbault traces the first principle of the instrument, the stretched string, to the ancient lyre; and from this he shows a course of gradual modification through the forms of the harp, the psaltery, the dulcimer, &c. The first marked approach to the pianoforte appears in the transition from the dulcimer to the clavicitherium (keyed cithara), a small oblong box, holding a series of strings in triangle form, and struck by *plectra* of quill attached to the inner ends of the keys. This application of the keyboard to stringed instruments is believed to have been first made in the 12th century. Next followed the clavichord, which continued in favor for about six centuries, though in part giving place to varieties known as the cymbal and manichord. The damper, a contrivance allowed to fall or rest upon the string, so as to arrest its vibration when the key has been released by the finger, was introduced at an early period into the clavichord. An improvement upon the keyed cithara, called the virginal, was very popular with Queen Elizabeth and ladies of her time. In this the strings, of catgut, were at once struck and pulled by pieces of quill fixed in the upper end of short, upright jacks upon the inner ends of the keys. The spinet, of about the same period (1500–1760), was a larger triangular box, having sometimes 49 strings, some of steel wire, and also played on by means of a jack and quill (*spina*). The body of the so-called square pianoforte, which is oblong in form, is evidently copied from that of the clavichord; while the almost triangular arrangement of the strings as clearly has its origin in the form assumed by the strings of the spinet. The harpsichord was substantially a horizontal harp, played by means of keys with jacks and quills. It was manufactured in Italy early in the 16th century, and long maintained its place, being extended from four to at least six octaves, and often having double strings; while into some of its improved forms were introduced pedals, and even arrangements for transposing the music by shifting the action of the keys to different sets of strings. The most distinguished harpsichord maker of London, from about the year 1740 to 1775, was Burckhardt Tschudi, a native of Switzerland, whose son-in-law, John Broadwood, was one of the earliest piano makers in England, founding the firm still represented in London under this name. The transition from the instruments here named to the piano appears to have taken place about 160 years since; and yet, unless we may rely on the article by Maffei in the *Giornale dei letterati d'Italia* (Venice, 1711), we must regard the place of this important invention and the inventor's name as obscure, or even lost. The invention has been claimed in turn by Italians, Germans, French, and English. By some writers it is asserted that the first improvement from the spinet and harpsichord consisted merely in the introduction into the latter of hammers, formed each of a leather button on the top of a short stout wire, taking the place of the jack. These hammers could not readily enough quit the string after striking, and its tone was in this way deadened. Such a change would form no marked improvement on those instruments. But the article of Maffei, above mentioned, which is full and specific, and accompanied with a cut, and which is translated at length in Rimbault's work, describes, as having been constructed by Bartolommeo Cristofali, a harpsichord maker of Padua, an instrument in which the strings were vibrated by hammers, and acted through a complex mechanism, the parts of which were a key, lever, movable tongue acting on the hammer, the hammer, its rest of silk strings, and a damper. Such a mechanism would allow of the rapid stroke and sudden recedence of the hammer, leaving the string free to vibrate until, by releasing the key, the damper should be allowed to check its movement; and thus it would accomplish in a manner all that was aimed at in the earlier "actions" of German and English makers. If this account be genuine, it settles a long controversy, and proves Cristofali (before 1711) the real inventor of the pianoforte. In 1716 Marius, a French maker of harpsichords, submitted to the academy four forms of instruments of which he claimed to be the inventor, termed by him *clavecins à maillets* (hammer harpsichords). In some of these the hammers were in a degree detached from the keys. A third claimant to the invention is Christoph Gottlieb Schröter, who asserted some years later that he had devised in 1717 an arrangement of keys, springs, and hammers, which others were already employing without due credit. He is believed by some to have suggested the present name by his statement, in a published account in 1768, that on his instruments the performer "at pleasure might play *forte* or *piano*." At the outset, however, the instrument was not appreciated, which may account for the obscurity resting over its origin. Silbermann of Freiburg first became somewhat popular as a manufacturer; and in 1747 Frederick the Great was so pleased with some pianofortes of his, that he purchased the whole stock, 15 in all; but these were still very imperfect, and were allowed to fall into disuse when, in 1765, the king received an improved harpsichord from Tschudi of London. Of these German instruments, which appear to have been square, the strings were double, and the compass was not more than four and a half or five octaves. They were adopted, however, by Haydn, Gluck, and other composers of the time; one made for Gluck in 1772 was 4½ ft. long by 2 ft. broad, the sounding board at one end only, and the strings mere threads compared with those now in use. The first piano known in England (about 1757) was made by an English monk at Rome. About 1760 many German mechanics arrived in England, two of whom, Viator and Backers, became known by their improvements in pianos. In 1767 the piano was introduced on the stage of Covent Garden theatre as "a new instrument," according to a playbill bearing date May 16 of that year, now in possession of the Messrs. Broadwood. About 1755 the poet Mason had invented an action for the piano; but this seems not to have come into permanent use. In 1774 a patent was granted to Joseph Merlin for a compound harpsichord, having hammers on the plan of the pianoforte. A more positive claim on the part of English makers is that concerning the first invention of a grand action, it being admitted that about 1772 Americus Backers, a German, assisted by John Broadwood and Robert Stodart, all in the employ of Tschudi, together succeeded in applying an action, similar to that then in use in pianofortes, to the harpsichord. The action devised by them is essentially the same as that still used by the firms of Broadwood and Stodart in London, early adopted by Pleyel and by Herz in Paris, and known among European mechanics as the English action, in this country more commonly as the Pleyel action. It is marked by simplicity, efficiency, and durability, whence it is called also the direct action. From the time of this change the harpsichord makers rapidly became piano makers. The earliest entry of a piano on the books of Broadwood and co. occurs under the date of 1771; of a grand piano, 1781.—The piano is now made in three distinctive forms: the grand, the square, and the upright; in the first two the strings run horizontally, in the third vertically or obliquely upward. Of these, the upright is the form most common in England, the square in the United States, but large numbers of upright and grand pianos are now made in this country. The square pianos of the United States probably surpass in workmanship and perfection of tone those of any other country; but the grand piano is that adapted to the introduction of the best mechanism, and hence it is always chosen in cases where, as in a concert instrument, the greatest power and brilliancy are required. In the grand, all the octaves, save about two lowest in the scale, have for each note three strings attuned in unison and struck at once by the same hammer; from four to seven of the lowest strings may be single, and through about another octave and a half two strings to each note are often used. The largest of these instruments are known as full or concert grands; a medium size, as semi-grands; a size still less, as parlor grands. The square piano, until the application to it of mechanism somewhat similar to that of the grands, was a very inferior instrument. The upright was at first a grand set on end, and raised on legs; the hammers over or in front of the strings, striking them at their lower ends. In other forms the hammers are almost invariably below the strings. The first patent for an upright appears to have been granted to William Stodart in 1795. In 1807 William Southwell of Dublin reduced the dimensions of the upright, before very unwieldy, replacing it by the "cabinet," in which also the frame was lowered, and by means of long slender stickers the strings were struck above. In 1811 Robert Wornum introduced the "cottage" upright, 4 to 5 ft. high; and in 1827 the "piccolo," rising not more than 3½ ft. from the floor. The compass of the scale of piano keys did not at first exceed five octaves, from FF, or the F below the lowest of the violoncello, to F in alt. It was next extended to C above; then to F yet above this, making six octaves; by a third extension, to the C below; and then, by an added treble string, to G. Thus its compass came to be from CCC (corresponding to about 64 single vibrations a second, and to an open organ pipe 16 ft. long) to G, six and a half octaves above. Large pianos are now commonly made with a compass of seven octaves, the bass reaching to about A below CCC, and the treble being extended also by one or more strings. In the London exhibition of 1851 was a piano of seven and a half, and another of eight octaves. The corresponding enlargement of the instrument, and especially of the sound board, gives an augmented volume and force of tone; but the deficient quality of the uppermost notes has led good judges to question whether any real advantage is gained by exceeding seven octaves.—The making of pianos is divisible into four parts: 1, the framing and sound board; 2, the stringing; 3, the keys and action; 4, the ornamental or other case. 1. *Framing and Sound Board.* In pianos of full to largest size, the sum of the tensions of the strings, when stretched in attuning, is not less than from 6 to 12 tons. Hence the framing, or those parts within the case which serve as a strut or stretcher between the ends of the strings, and which are to resist this enormous pull, must be made correspondingly strong and rigid; since by any gradual yielding under the pull of the strings, their lengths and tensions, and hence their tone, must undergo proportionate change. In the earlier instruments, having small strings, the frame was of timber only. Builders then sought only truthfulness of tone, depth and power being out of the question. With the progress of metallurgy, and the gradual introduction of iron structures, this metal came to be used for the piano frame (*i. e.*, for the platform or parts receiving the strings, which is not to be confounded with the case). This frame was cast in a few parts, which were united by bolts or screws; and this plan is still followed in London, and indeed in Europe generally. In pianos of all forms, the scale of lengths of successive strings required to yield the notes through the compass of the instrument results in a series of strings conveniently grouped in a form identical with or approximating that familiarly known in the harp. In grands the inner or remote ends of the strings run in a curve representing the curved side of the harp, the treble strings lying to the right hand. In squares, usually, the harp curve is represented by the ends of the strings toward the right-hand side of the performer, and lying nearer to him. The ends of the strings corresponding to the straight side of the harp thus lie, in grands, in front, terminating in this case, however, in a less marked curve; and the like extremities in the squares, which until recently always terminated in a straight line, lie to the left hand and back of the instrument. It is near to this part of the strings—at the remote side in squares, and in front in grands—that the hammers are always made to strike, the proper distance of the point of striking being about one eighth to one ninth the entire length of each string. The parts of the framing and connections of the strings can now be understood. Always at the ends which are arranged in what we have called the harp curve, the strings are permanently fastened to pins or studs, now made to enter and project directly from the iron plate. About each one of these, called the hitch pins, a string is in some cases bent, so as to return to the other side, corresponding to two single wires; in other cases, each single wire is secured to a pin by terminating in a loop. In either case, the strings terminate in ends at the opposite (answering to the straight) side, and each is here wound about a larger movable pin, by turning which the tuner increases or relaxes the tension. The plate in which stand the hitch pins is termed the string plate; that receiving and giving support to the tuning pins (wrest pins), the wrest plank; and this, owing to the greater sonorousness of wood than of iron, is almost invariably a wooden strip or plank, though in various ways let into and supported by the iron castings which furnish the required strength to the part. The string plate and wrest plank are secured by bolts and otherwise to firm timbers beneath them; the whole being received within the parts of the case. But the chief part of the strain of the strings is borne, in grands, by means of several strong iron or steel bars rising above the strings, and running parallel with them, and in squares by one or two such bars, these being formerly, and in Europe still in most instances, cast separately, and then firmly screwed down to the iron plates at both ends. In grand pianos the framing and sound board are severed across in front, to allow of the rise of the hammers, this part being strengthened by arches of metal and otherwise. The system of metallic bracing, first generally introduced by the invention of Thom and Allen in 1820, was brought nearly to its present form, including the tension bars above referred to, by Pierre Érard of Paris in 1825. The sounding board is a sheet of thin, carefully prepared board, usually made of American spruce, free from knots and flaws, strengthened on the under side with small transverse ribs, and now made to extend across nearly the entire instrument, beneath the strings. Its edges merely are grasped between parts of the frame and case, and sometimes at particular points only, so that the middle portion is left free to vibrate. On its perfection the quality of the tones must depend in a high degree. 2. *Strings.* At first steel wires were used for the treble notes of the pianoforte, and brass for the bass; and as all the wires were short, those for the lower notes were wound or overlapped by wires of less thickness, for the purpose of increasing their weight, to a greater extent than is now required. Mr. Collard introduced in 1827 the plan of bending each wire about the hitch pin, as now commonly practised, thus obviating the tendency of the string to yield, twist, or break, in consequence of the noose formed at the end. Steel wire was also introduced throughout. A few of the lower strings are still wound, the upper of these with soft iron, the lower with copper; and this lapping is now with finer wire, and very close. The length of the vibrating part of each string is determined by the places of two bridges, over or through holes in which the strings are stretched. The bridge nearest the hitch pins is upon and attached to the sound board, to which it aids in communicating the vibration of the strings; the other runs along the edge of the wrest plank or plate, near to the tuning pins. Beyond the bridges at either end the string is known as dead wire, and any interfering vibration of this part is prevented by interlacing these ends with stout tape, or in other ways. When both supports determining the vibrating length of the strings were bridges merely, the blow of the hammer from below tended slightly to elongate the string and to lift it from the nearer bridge, and so altered the tone. To prevent this result, Sébastien Érard invented in 1808 the plan of passing the strings at the end struck by the hammers through holes piercing the bridge or rim projecting from the wrest plank, and so shaping the latter that from these holes the strings slope directly upward to the pins. The effect of this important improvement, termed the upward bearing, is that the string is no longer lifted or appreciably lengthened by the blow of the hammer, since to this the strain of the string is now directly opposed; and its length remaining constant, its pitch is equable and its tone stronger. An improvement called the agraffe (*à graffe*) was also introduced by Sébastien Érard in 1819, in which the bridge just spoken of is conveniently replaced by a stud or pin for each string, pierced with two or three holes for the wires, and made fast below in the wrest plank. 3. *Action.* By the action of the piano is to be understood the mechanism, consisting of several small interposed parts, by which the pressure of the finger upon each key is to be transmitted in the most effective manner through the hammer to the corresponding string. The oldest of the actions which have been (in modified forms) retained are those of the square piano. In the original of these the key had upon it near its inner end a lifter of stout wire capped with a soft leather button, this striking and elevating the hammer; while still beyond this rose a sticker which at the same time lifted from the wire a damper above it—a lever having a bit of soft cloth at the end; on releasing the key, this damper returned upon the string, checking its vibration. This arrangement formed the single action. Its faults were that the tone was thin and wiry; that in playing very *piano* the pressure on the key did not always cause the hammer to reach the string; while, if the hammer rest was brought too near the string, the hammer did not quit the latter soon enough, and the effect of this was termed blocking. To remedy these defects, Longman and co. introduced the hopper or grasshopper, invented in 1786 by John Gieb. This hopper took the place of the lifter; it was a jointed upright piece which, when the key was pressed down, engaged in a notch under the hammer, and just before the instant of striking slipped past the end of the hammer, allowing this after the blow suddenly to fall. With this was employed also a second or under hammer, multiplying the velocity of the first, on the principle of the compound lever. This mechanism was the double action, still substantially in use with many makers in uprights and squares. To this was afterward added the Irish damper, the invention of Southwell (1794–'8), which was simply an upright rod, with a piece of soft cloth above, which the key, so long as it remained depressed, lifted off the string. Still the hammers would sometimes rebound from the string with such force as to return upon it, checking its sound. To remedy this, a small, inclined, rough surface of felt was so fixed on a wire support as to be rubbed by the head of the hammer in its descent, and thus gradually to destroy its velocity; this was called the check. The English grand action, so called, already alluded to as that of Backers, adopted by Broadwood, Stodart, and others, consisted of a key, a jack (lever, in place of the hopper), a button so placed as to regulate the sweep of the jack, a spring pressing to restore the jack to its place after the movement, a hammer on the but of which the jack acted, the check, and a damper arrangement, of which various forms could be employed, with rails and sockets connecting or fixing the needful points. But in this arrangement it was still a defect that, after a stroke of the hammer, the jack could not reëngage it until, by release of the key, the parts had returned to their first position. This required time, and any note could not be rapidly repeated. The defect was first remedied by an invention of Sébastien Érard in 1821, improved in 1827, termed the repetition action. This was an improvement upon a previous action of his, which as now modified, under the name of the French action, is still in use with many makers in America and Europe, and the origin of which is believed to be due to Petzold. In the repetition action, consisting of an arrangement of levers and springs too complex to be described here, the hammer is caused to be, through its whole sweep, at the command of the player, so that the note can be reproduced at half stroke, or at any fraction of an entire stroke. To secure this result, when the hammer recoils from the string, it is, by means of a roller, lever, and spring, upheld so long as the key is not entirely released, and in such a way that it can neither return to the string nor fall; and while thus suspended near the string, its blow upon the string may be, by aid of an escapement button, repeated at the pleasure of the player. The French repetition action is thus complex and delicate. Broadwood retained the English grand action, applying to it directly a repetition adapted from the French by Southwell, probably in 1827. This was accomplished by passing through the hammer but a block or bar, a spring pressing upon this so that when the jack passes the notch it is caught by this bar, and the hammer is sustained ready to repeat the blow, until, as before, the key is entirely released. The escapement button also appears in this arrangement, and a second spring determining the height at which the hammer shall rest. The varieties of grand action are very great, those used in the United States being all based on either the English, here described, or the French of Petzold and Érard.—Stops were early introduced into the piano, but, save in parts of continental Europe, they have been abandoned; several pedals are there also used, but in England and this country only two, one for *forte* effects, the other for *piano*. The *forte* pedal is quite effectual, and besides not injurious to the instrument. The earlier *piano* pedal, passing the action to one string, is straining to the centres of the hammers, and apt to disturb the tuning of the unisons—the strings intended to yield the same note. The *jeu céleste*, a later pedal arrangement, obviates these defects. In this, tongues or strips of soft leather or wool are so held, that by pressure on the pedal they can be raised between the strings and the hammers, thus softening the sound. This, of late somewhat contested, we have seen in a piano of Petzold's, marked 1823; and in the same also is found the long or full sound board, supposed by many to have been more recently introduced. It should be added that the hammers are of wood, the heads covered, according to size, with one or more layers of thick and firm felt. This material, soft woollen. &c., are introduced in many parts also to prevent the click or rattling which would otherwise attend the movements.—Various contrivances have been resorted to for the purpose of securing sustained sounds in the pianoforte; a very good example of these was Mott's *sostinente* pianoforte (1817), in which the continued tone was attained by communicating the vibration of the strings to silk threads and skeins arranged in a peculiar manner. The æolian attachment of Isoard consists in causing a current of air, supplied by a bellows, to act on the string, thus prolonging its tone on the principle of the æolian harp. A similar effect is produced by the æolian attachment invented by Mr. Obed Coleman of Barnstable, Mass., about 1843. In "transposing pianofortes," the keyboard and action, or the strings and framing, can be shifted laterally, so as to cause the hammers to strike a different set of strings, thus transposing the music, according to the arrangement, a half or whole note, or several notes, upward or downward. Melographic pianos, or those which, by added mechanism, shall register and preserve the improvisations of a composer, have been attempted by many, dating from the time of Hohlfeld, who, at the suggestion of Euler, essayed this in 1752. Probably the most successful attempt of this kind is that of Debain of Paris, exhibited in 1851. 4. *Case, and Making.* It is unnecessary here to detail particulars concerning the case of the piano, or concerning the various woods, metals, and other materials found to be best fitted to enter into its construction. The manufacture of the instrument gives employment to a great variety of artisans, among whom the work of the several parts is minutely divided; these are the key makers, hammer makers, hammer leatherers, string makers, stringers, case makers, finishers, &c. The construction is a slow process, and cannot well be hurried, the making of a grand piano usually requiring six months.—*American Manufacture and Improvements.* Until the beginning of the present century the attempts at pianoforte making in the United States were few, and the results of no practical importance. Jonas Chickering, the founder of the house of Chickering and sons, of Boston and New York, has been properly called the father of the business in the United States. He was a cabinet maker, began to manufacture pianos in 1822, and exposed his first instrument for sale in Boston on April 15, 1823. At the time of his death, in December, 1853, his business had increased to 15 pianos a week, and since, in the hands of his sons, it has become still more widely extended. The two most prominent features in the recent wonderful development of the piano manufacture in America are the invention and gradual perfection of the iron frame and the introduction of the overstrung scale. A patent was granted in 1825 to Alpheus Babcock of Philadelphia for the invention of a cast-iron frame, made oblong to increase the power of resistance to the pull of the strings. In this the principle was first practically introduced of casting the hitch-pin plate and that part which supports the wrest plank in one piece. In 1833 Conrad Meyer of Philadelphia exhibited, at the fair of the Franklin institute in that city, a square piano with a full cast-iron frame, substantially like that now used by all American makers. Jonas Chickering was the first (1837) to use the entire iron frame cast with the parallel bars in one piece; and about 1840 he applied the same principle to the construction of grand pianos, while John Buttikofer of New York, who began the manufacture of grand pianos at the same time, imitated in every respect the instruments of Sébastien Érard. Instead of using the agraffes of Érard and other European makers, Chickering cast the iron frames of his grand pianos with an upward ledge or projection, through which holes were bored for the passage of the strings. In 1845 he adopted the circular scale for square pianos, in which the strings were less crowded and the tone was strengthened and improved. At that time upright pianos were not manufactured in America, and the wooden imported uprights having failed to stand the climate, a prejudice arose against them which for many years prevented American makers from adopting that form. Although pianos with the iron frame stand in tune better than those constructed wholly of wood, their thin sharp tone prevented their general adoption, and up to 1855 their manufacture was confined chiefly to Boston. The New York makers used in their square pianos only a small hitch-pin plate, securing the capacity of standing in tune by solidity of construction, heavy bracing of the case, and the use of a solid bottom or bed, about 5 in. thick, which made the instruments heavy in weight and appearance. When the compass gradually extended to seven octaves and more, it was found impossible to obtain the necessary power of resistance against the pull of the strings when the case was made of wood only. The adoption of the iron frame then became necessary. In 1855 Steinway and sons of New York constructed a piano with a solid front bar and full iron frame, the latter covering the wrest plank, the bridge of which was made of wood. The brace in the treble connecting the hitch-pin plate with the wrest-plank plate was slightly elevated above the strings, and ran in a different direction from the latter, exactly to the angle at which the wrest plank had to sustain the pull of the strings. The bridges of the sounding board were so grouped that they came considerably nearer to its middle, and their lineal length was increased by placing the bass strings over the others (overstringing them) across three nearly parallel bridges, the length of which over the sounding board was increased from 40 to 64 in., while their position was changed to nearer the middle of the sounding board. The first instrument made on this plan received the first prize, a gold medal, at the exhibition of the American institute in the crystal palace, New York, in 1855, and the new mode of construction soon became the standard for all manufacturers in this country. In 1856 Steinway and sons began the manufacture of grand pianos, and several other New York houses soon followed. The grand pianos made in America at that time were constructed on the same general principles as those made in Europe, but with a cast-iron frame. On Nov. 29, 1859, Steinway and sons received a patent for an improvement, consisting of a complete cast-iron frame, in which the projection for the agraffes lapped over and abutted against the wrest plank, and a new arrangement of the strings and braces. In the treble register the strings were parallel with the blow of the hammer, but from the middle of the scale the unisons of the strings were spread gradually from right to left like a fan along the bridge of the sounding board. The covered strings of the lower octaves were laid a little higher and across the others, and spread in the same form as the others, but from left to right, on a lengthened sounding-board bass bridge running parallel to the first bridge. Several important advantages were thus obtained. By lengthening the bridges of the sounding board, more of its surface was covered; the space between the unisons of the strings was increased, thus more powerfully developing the sound from the sounding board; and the bridges, being moved from the iron-covered edges nearer to the middle of the sounding board, produced a greater volume of tone, while the obliqueness of the strings in respect to the blow of the hammers produced the rotating vibrations which give to the thicker strings softness and pliability. The system of bracing also was far more effective, and the power of keeping in tune greatly increased. The first grand piano constructed on this plan was played publicly for the first time at the New York academy of music, Feb. 8, 1859. Lindeman and sons of New York introduced in 1860 the so-called cycloid pianos (patented Aug. 7, 1860), intended to combine the advantages of the grand and square forms, while possessing the strength and sonorousness of tone of the grand piano. In 1863 a patent was granted to Decker brothers of New York for an improvement in square pianos, by which they claimed to prevent the too heavy bearing of the strings. A patent was given to Steinway and sons in 1866 for a double iron frame for upright pianos, in which the front plate and rear frame were cast in one piece, giving the instrument a superior capacity for standing in tune; also for an improvement called the resonator, which has since been applied to all their pianos. In 1868 they received a patent for a tubular metallic frame action to take the place of the wooden bars which formerly supported the action, and which were subject to atmospheric influences. It is sustained by hollowed brass tubes filled with wood, which are not affected by the atmosphere. Patents were granted to Chickering and sons on July 7, 1868, and April 6, 1869, for a combination truss frame and other improvements in the construction of upright pianos, tending to increase their capacity for standing in tune. In 1870 George Steck and co. of New York also received a patent for an improvement in upright pianos, consisting of an iron plate so constructed as to hold all the inner works of the instrument, which are fastened to it before it is put into the case. In 1872 the same firm introduced the small parlor grand piano, which, although only 6 ft. long, is said to surpass the square piano in richness and volume of tone, and to be but little inferior to the full grand piano. Decker brothers and Albert Weber of New York, and Knabe and co. of Baltimore, have also made the manufacture of upright pianos a specialty, and large numbers of them are now produced in these two cities and in Boston. On May 14, 1872, a patent was granted to Steinway and sons for an improvement by which is added to the principal scale a second scale of reduced proportional length, between the agraffes and tuning pins, representing a higher octave for each note. Chickering and sons' latest improvement, the double-bearing agraffe, was patented Dec. 11, 1872. Steinway and sons also received a patent on Oct. 27, 1874, for a tone-sustaining pedal, by which the tones of distinct notes or groups of notes are sustained without interfering with the remaining notes of the scale. No essential improvements in the pianoforte have been made by European manufacturers during the past 30 years. This was proved by the results in the musical department of the Paris exposition of 1867, where the highest honors were awarded to Messrs. Chickering and Steinway, and the decoration of the legion of honor was conferred on Mr. C. F. Chickering. The United States now far outstrips Europe in the manufacture, and possesses the two largest establishments in the world. Exact statistics of the American piano trade are attainable from the internal revenue returns for several years prior to 1870, when the tax was abolished. The gross amount of sales of new pianos by the 26 most prominent firms in the United States during the year 1869 was $5,253,167, distributed as follows: New York makers (17), $3,104,-788; Boston (6), $1,632,500; Baltimore (3), $515,884.—For further information concerning the history and construction of the pianoforte, see Fischhof's *Versuch einer Geschichte des Clavierbaues* (8vo, Vienna, 1853); Pole's "Musical Instruments in the Exhibition of 1851" (London, printed for private circulation); Rimbault's "Pianoforte," &c. (4to, London, 1860); Paul's *Geschichte des Klaviers* (8vo, Leipsic, 1868); Blicthour and Gretschel's *Lehrbuch des Pianofortebaues* (1871); and Brinsmeade's "History of the Piano Forte" (London). In respect to performing, tuning, &c., there are various popular manuals.

PIARISTS, or **Fathers** (REGULAR CLERKS) **of the Pious Schools** (*scholarum piarum*, whence the popular name), a religious order in the Roman Catholic church, whose members take, in addition to the three common monastic vows, a fourth, to devote themselves to the gratuitous instruction of youth. The order was founded at Rome by St. Joseph Casalanza or Calasanctius (1556–1648), a Spanish priest of noble birth, who in 1597, in union with three other priests, opened a free school, which was soon attended by upward of 700 children. In 1617 Pope Paul V. conferred on the corporation of teachers the rank of a religious congregation, and in 1621 Gregory XV. gave them all the privileges of a religious order. The same pope in 1622 confirmed their rule, and appointed Casalanza their first general. The order was suppressed by Innocent X., in consequence of serious internal dissensions, but reëstablished by Clement IX. It spread rapidly through Italy, Germany, and Poland, and became eminently popular. The Piarists suffered less than any other order from the reformatory decrees of Joseph II. of Austria, and were exempted from the general suppression of convents in Spain in 1836. More recently they were equally favored in the Sardinian dominions. In 1860 they possessed 28 houses in Italy, 33 in Germany, 32 in Hungary and its dependencies, 14 in Poland, and about 30 in Spain. They are now suppressed in Italy, like other religious orders. In 1870 they had 29 houses in Cisleithan Austria, about an equal number in Hungary, and a few in Poland and Spain. At the head of the order is a general, who is elected by the general chapter for six years, and resides together with a procurator general and two assistants at Rome. Every province is governed by a provincial, and every college has a rector and vice rector.

PIAST, Dynasty of. See POLAND.

PIASTER (Span. and Ital. *piastra*), a silver coin and money of account, used chiefly in Turkey and the Levant, and called in Turkish *ghersh*. It is of very variable value. The actual present value of the official piaster of Constantinople is 4·383 cents, but it is reckoned in the United States at 4·369 cents. This is the 100th part of the gold coin called a medjidié. The small coin called a piaster, about the size of a half dime, is worth about 4 cents. The term piaster is also applied to the Spanish and Italian dollars, and is used in South America and the West Indies.

PIATT, an E. central county of Illinois, intersected by the Sangamon river; area, 275 sq. m.; pop. in 1870, 10,953. The surface is level and the soil fertile. It is traversed by the Toledo, Wabash, and Western, the Monticello, and the Indianapolis, Bloomington, and Western railroads, and other lines. The chief productions in 1870 were 66,144 bushels of wheat, 1,029,725 of Indian corn, 130,610 of oats, 33,675 of potatoes, 106,476 lbs. of butter, and 9,455 tons of hay. There were 3,483 horses, 7,497 cattle, 3,180 sheep, and 12,654 swine. Capital, Monticello.

PIATT. I. John James, an American poet, born in Dearborn co., Ind., March 1, 1835. He was educated at Kenyon college, and in 1857 he contributed poems to the Louisville "Journal," and in 1859 to the "Atlantic Monthly." In conjunction with W. D. Howells, he published "Poems of Two Friends" (Columbus, O., 1860), and with his wife, "The Nests at Washington, and other Poems" (New York, 1864); and he has since published "Poems in Sunshine and Firelight" (Cincinnati, 1866), "Western Windows, and other Poems" (New York, 1869), and "Landmarks, and other Poems" (1871). He resides near Cincinnati. **II. Sarah Morgan Bryan**, wife of the preceding, born near Lexington, Ky., Aug. 11, 1836. Besides the volume of poems published with her husband, she has published "A Woman's Poems" (Boston, 1871), and "A Voyage to the Fortunate Isles" (1874).

PIAUHY, a N. E. province of Brazil, bounded N. by the Atlantic, E. by Ceará and Pernambuco, S. by Bahia and Goyaz, and W. by Maranhão; area, 94,500 sq. m.; pop. in 1871, 232,000. Piauhy has but 20 m. of seaboard, and only one port, at the mouth of the main stream of the Parnahyba. The face of the country, generally low in the coast region, swells toward the east and south, and culminates in the Serras Vermelha and dos Dous Irmãos, which on the boundary with Pernambuco form a sort of narrow plateau attaining a maximum elevation of 1,500 ft. above the sea. The whole province is watered by the Parnahyba and its tributaries. The Parnahyba rises on the border of Goyaz, and flows generally N. N. E. through a more or less swampy country to the sea, into which it falls through six mouths. Its entire length is estimated at 990 m., and it is said to be navigable for 780 m. The principal affluents are the Gurgueia, Piauhy, Canindé, and Poty. The climate is hot and somewhat damp and insalubrious, particularly in the low grounds near the rivers. The soil is for the most part fertile. The vegetation is locally distinguished into the *mimosa* of the east, characterized by catinga forests, with plants copiously furnished with hairs and prickles, stiff leaves, small flowers, a very tender fibre, and not unfrequently a milky juice; and the *campos agrestes* of the west country, in which forests of gnarled and stunted trees, palms, and open plains alternate. The pasture grounds of the last support a rich, coarse perennial grass. Agriculture is backward. The principal cultivated products are cereals, cotton, the sugar cane, mandioca, and tobacco. Cattle rearing is the chief industry of the province, and the principal manufactures are rum and sugar. The roads are extremely bad, and the means of transport very inefficient. Education receives a fair share of attention, there being, according to last reports, 68 schools, 11 of which are private, and 25 for females, with a total of 1,738 pupils, of whom 456 are females. The capital, Therezina, has a lyceum; and Oeiras and Amarante have each a college. The only other town of importance is Parnahyba, the port, which is exceedingly unhealthy.

PIAZZA ARMERINA, a town of Sicily, in the province and 17 m. S. E. of the city of Caltanisetta; pop. about 23,000. It is situated on the crests and slopes of an isolated hill more than 1,500 ft. high, rising in the midst of luxuriant foliage. The vicinity abounds with pine and other trees, and from its abundance of shade tempering the summer heat it has received the designation of *la deliziosa*. The cathedral rises on one of the two crests of the hill, and a feudal castle now used as a prison on the other. The principal products are wine and nuts. Many landed proprietors reside here.

PIAZZI, Giuseppe, an Italian astronomer, born at Ponte, in the Valtellina, July 16, 1746, died in Naples, July 22, 1826. He joined the order of the Theatins at Milan, became in 1770 professor of mathematics in Malta, next taught philosophy and mathematics at Ravenna, was a preacher at Cremona, and professor of dogmatic theology in Rome, where he was a friend of Chiaramonti, afterward Pius VII. In 1780 he became professor of astronomy in Palermo, where he subsequently established an observatory, and in 1817 was appointed general director of the new observatory at Naples. On Jan. 1, 1801, he discovered Ceres, the first of the asteroids. In 1803 he published *Stellarum Inerrantium Positiones*, a catalogue of 6,748 stars, the results of the observations of ten years, and in 1814 a second catalogue embracing 7,646 stars. Among his other works is *Lezioni elementari di astronomia* (2 vols., Palermo, 1817).

PICARD, Jean, a French astronomer, born in La Flèche, July 21, 1620, died in 1682. He assisted Gassendi in observing the solar eclipse of Aug. 25, 1645, was appointed in 1655 his successor in the chair of astronomy at the collége de France, and became in 1666 one of the original members of the academy of sciences. His introduction of several improvements in practical geometry greatly increased the exactness of scientific observations. In connection with Azout he reinvented the micrometer, was the first to apply a telescope in the measurement of angles, devised methods of verification in astronomical investigations, made in 1669–'71 the first exact measurement of a degree of the meridian between Amiens and Malvoisine, and pointed out the twofold phenomena of nutation and aberration, afterward explained by Bradley. He also introduced the modern method of determining the right ascension of the stars by employing a pendulum to note the instant of their meridional passages. In order to make the observations of Tycho Brahe more accessible to astronomers, he visited Uranienborg in 1671 to ascertain the latitude and longitude of the observatory at that place. He welcomed to France the celebrated Cassini; and when, through his exertions, the observatory of Paris was established, he saw without envy the Italian philosopher promoted to the directorship of an institution of which he himself was the father. He wrote valuable works.

PICARD, Louis Joseph Ernest, a French statesman, born in Paris, Dec. 24, 1821. He began to practise law in 1846, and acquired a fortune. Subsequently he was prominent in journalism as an opponent of Louis Napoleon. He was elected to the legislative body in 1858, 1863, and 1869. After the downfall of the empire (Sept. 4, 1870), he became a member of the government of national defence as minister of finance. In January, 1871, he was associated with Jules Favre in negotiating with Bismarck the terms of capitulation, after having declared prolonged resistance to be a heroic folly. On Feb. 19 Thiers appointed him minister of the interior, but he resigned May 31. Thiers offered him the place of governor of the bank of France. He declined, but accepted the mission to Brussels, and retained it till after the retirement of Thiers, May 24, 1873. In 1874 he greatly contributed to the overthrow of De Broglie's administration, and in July he supported in the assembly Casimir-Périer's unsuccessful constitutional bill.

PICARDY, an ancient province of N. France, bounded N. by the straits of Dover and Artois, E. by Champagne, S. by Île de France, and W. by the English channel and Normandy. It was divided into Upper Picardy, in its widest sense including the districts of Amiénois, Santerre, Vermandois, Thiérache, Laonnais, Soissonnais, Noyonnais, Valois, and Beauvaisis, and Lower Picardy, comprising the *pays reconquis*, Boulonnais, Ponthieu, and Vimeux. It was conquered by the Franks in the 5th century, formed part of the kingdoms of Soissons and Neustria, and afterward passed into the possession of the counts of Flanders, and was divided among several vassal counts. The province was subdued by the English under the reigns in France of Philip VI. and Charles VI., reconquered by Charles VII., who mortgaged it to the duke of Burgundy, and restored to the crown in 1463, under Louis XI. Its capital as a province was Amiens. It forms now the department of Somme and parts of Pas-de-Calais, Aisne, and Oise.

PICCINI, or **Piccinni, Nicolò,** an Italian composer, born in Bari in 1728, died at Passy, near Paris, May 7, 1800. At 14 years of age he was placed in the conservatory of Sant' Onofrio at Naples, where he studied for 12 years under Leo and Durante. He first wrote several comic and serious operas for the theatres of Naples, and was then called to Rome, where he produced in 1758 *Alessandro nell' Indie*, containing one of the finest overtures ever composed. Two years later appeared his *Cecchina ossia la buona figliuola*, the drama of which, by Goldoni, was founded upon Richardson's "Pamela." It obtained an almost unprecedented popularity. It was succeeded by *Olimpiade*, a subject previously set by Pergolesi and other celebrated composers. In 1773 he returned to Naples in consequence of the intrigues of his enemies at Rome, who succeeded in having him supplanted there by Anfossi. In 1776 he visited Paris for the purpose of writing for the French opera. Gluck was the favorite of the hour, and Marmontel and other partisans of Italian music, who were opposed to the new ideas of the German composer, supported Piccini, then in the zenith of his fame. The next three years are famous as the period of the war between the "Gluckists" and "Piccinists," during which Paris was convulsed as if by a political revolution. Marmontel modernized Quinault's drama of *Roland*, and with infinite labor went over the whole work with Piccini, who was up to this time totally ignorant of the French language. The composer, whose facility was attested by the production previous to this time of 300 operas, found little difficulty in setting the words to appropriate music, and, after a twelvemonth of delays and difficulties of all kinds, *Roland* was performed with complete success. Piccini next produced *Atys* and *Iphigénie en Tauride*, the latter as a rival to Gluck's opera of the same name. He continued to compose with remarkable fertility, and after 1783 held the office of professor in the *école de chant*. In 1791 he was deprived of his pensions and employments, and returned to Naples. There he was suspected of sympathy with the doctrines of the revolution, and was subjected for several years to constant persecution and surveillance. In 1798 he returned to Paris poor and enfeebled in health. With much difficulty he procured from Bonaparte the post of inspector of music at the national conservatory in Paris, but died before he could enter upon its duties. As a musician Piccini is distinguished for the purity and simplicity of his style, and for the richness of his invention. Few of his numerous productions, however, have permanently retained the high place assigned them during his life.

PICCOLOMINI, an Italian family, associated with the history of Siena and Amalfi. Æneas Sylvius Piccolomini in 1458 became pope as Pius II. His sister, Laodomia Todeschini, was the mother of Pius III., who died a few weeks after his election in 1503. Other prominent members of the family were Alessandro (1508–'78), a prelate of Siena, and one of the first scholars who used the Italian language in philosophical writings, and Francesco (1520–1604), a follower of Plato, teacher of philosophy at Siena and other places, and author of *Universa Philosophia de Moribus* (Venice, 1583).

PICCOLOMINI, Marietta, an Italian singer, a member of the preceding family, born in Siena in 1836. She appeared in 1855 at Florence in *Lucrezia Borgia*, and Verdi composed *La Traviata* for her. She was successful in London and the United States, but less so in Paris, and retired from the stage in 1861.

PICCOLOMINI, Ottavio, an Austrian general, born in 1599, died in Vienna in 1656. He was a descendant of a sister of Pope Pius II. He early entered the Spanish army at Milan, served under the emperor Ferdinand II. against the Bohemians, and is said to have commanded at the battle of Lützen the cavalry regiment in an encounter with which Gustavus Adolphus lost his life (1632). He was subsequently appointed to a high military command by Wallenstein, but when that general meditated treason he informed the emperor of the plot, and was ordered by Ferdinand to capture Wallenstein dead or alive. Before he could execute this command the latter was assassinated (1634), and Piccolomini received part of the Wallenstein estate. During the remainder of the thirty years' war he held important commands against the Swedes. In 1635 he drove the French from the Netherlands, but was less successful against the Dutch. His victories over the Swedes led Philip IV. of Spain to ask his services, and he fought a second time with advantage at the head of the Spanish forces against the French and Dutch. In 1648 he was recalled and made marshal. After the peace of Westphalia he was sent to the convention of Nuremberg (1649), with full powers, and subsequently was made a prince of the empire, the king of Spain having reinstated him in his hereditary fief of the duchy of Amalfi. He was childless, and his son Max, in Schiller's "Wallenstein," is a fiction.

PICENUM, an ancient division of central Italy, bordering on the Adriatic, Umbria, and the territories of the Sabines and Vestini. It was traversed by spurs of the Apennines, and drained by the Truentus (Tronto) and other streams. Among the towns were Ancona, colonized by Greeks from Syracuse, Firmum (Fermo), Hadria (Atri), Auximum (Osimo), Asculum (Ascoli), and Interamna (Teramo). The original Umbrian inhabitants were conquered by the Picentes or Piceni, a Sabine people, who were subdued by the Romans in 268 B. C. The Picentes joined in the social war and secured the right of franchise.

PICHEGRU, Charles, a French general, born at Arbois, Feb. 16, 1761, died in Paris, April 5, 1804. He was teacher of mathematics at Brienne while Bonaparte was a student there, afterward entered the artillery, and rose rapidly in the French revolutionary army. In 1793 he succeeded Hoche as commander of the armies of the Moselle and Rhine, and in 1794 took command of the army of the north. After repeatedly defeating the English and Dutch, he entered Amsterdam, Jan. 19, 1795, and organized the Batavian republic. He soon after resumed his command of the army of the Rhine, and agreed with the prince of Condé to exert himself for the restoration of the monarchy, brilliant rewards being offered to him in the name of the future king. His troops being now worsted by the Austrians, and the suspicions of the directory aroused, he was deprived of his command in 1796. Nevertheless, in the following year he succeeded in being elected to the council of 500, and became its president and the leader of the royalist party. He was arrested with other conspirators, Sept. 4 (18th Fructidor), 1797, and banished to Cayenne. In June, 1798, he escaped, and went to London and Berlin to intrigue against the French government, in consequence of which he was expelled from the latter city. Returning to London, he planned with Cadoudal the assassination of Napoleon, and they secretly arrived in Paris in 1803; but they were both arrested, and a few days later Pichegru was found strangled in his cell.

PICHINCHA. See ECUADOR.

PICHLER, Aloys, a German author, born at Burgkirchen, Bavaria, in 1833, died at Siegsdorf, June 3, 1874. He studied at Munich, was ordained a priest in 1859, and was professor at Munich from 1862 to 1869, when he became director of the imperial library at St. Petersburg. He was accused in 1871 of purloining books from it, and banished to Siberia, but was pardoned and returned to Germany. He published *Geschichte der kirchlichen Trennung zwischen dem Orient und Occident* (2 vols., Munich, 1864), and *Die Theologie des Leibniz* (2 vols., 1869–'70).

PICHLER, Karoline von, a German novelist, born in Vienna, Sept. 7, 1769, died there, July 9, 1843. She was a daughter of the councillor Von Greiner, and in 1796 married Andreas von Pichler. Her complete works comprise 60 volumes (Vienna, 1820–'45), besides her *Denkwürdigkeiten aus meinem Leben* (4 vols., 1844). Her novels had a wide circulation, especially *Agathokles* and *Frauenwürde* (1808). Her best known dramas were *Germanicus* and *Heinrich von Hohenstaufen* (1813).

PICHON, Pierre Auguste, a French painter, born at Sorrèze, Tarn, Dec. 6, 1805. He studied under Ingres, and became known as a painter of portraits and of historical and religious subjects. Among the latter are his "Communion," for the cathedral of Amiens, and "St. Memmie Resuscitating a Child," for the government. His more recent productions comprise "Reception at Windsor by King Richard II." (1866), "The Immaculate Conception" (1868), "The Annunciation" (1869), and fine frescoes for prominent churches of Paris.

PICKAWAY, a S. central county of Ohio, intersected by the Scioto river, and drained by Darby, Deer, and Walnut creeks; area, about 500 sq. m.; pop. in 1870, 24,875. It has a level surface and a very fertile soil. It is intersected by the Ohio canal, and by the Cincinnati and Muskingum Valley railroad. The chief productions in 1870 were 445,346 bushels of wheat, 2,867,598 of Indian corn, 95,008 of oats, 72,654 of potatoes, 301,290 lbs. of butter, 80,392 of wool, and 11,399 tons of hay. There were 10,285 horses, 6,491 milch cows, 16,687 other cattle, 24,628 sheep, and 54,288 swine; 4 manufactories of carriages and wagons, 1 of engines and boilers, 7 saw mills, 7 flour mills, 1 distillery, 1 tannery, and 1 currying establishment. Capital, Circleville.

PICKENS. I. A N. W. county of South Carolina, bordering on North Carolina, bounded N. E. by the Saluda and S. W. by the Keowee; area, about 500 sq. m.; pop. in 1870, 10,269, of whom 2,538 were colored. Its surface is uneven, the Blue Ridge extending along the N. border. Much of the soil is fertile. The Blue Ridge railroad touches the S. W. corner. The chief productions in 1870 were 20,930 bushels of wheat, 214,759 of Indian corn, 13,523 of sweet potatoes, 55,676 lbs. of butter, and 489 bales of cotton. There were 1,170 horses, 1,819 milch cows, 2,867 other cattle, 4,812 sheep, and 8,500 swine. Capital, Pickens Court House. **II.** A N. county of Georgia, drained by affluents of the Etowah and Coosawattee rivers; area, about 350 sq. m.; pop. in 1870, 5,317, of whom 129 were colored. The surface is elevated and mountainous; the soil of the valleys is fertile. The chief productions in 1870 were 25,269 bushels of wheat, 191,447 of Indian corn, 13,816 of sweet potatoes, 46,914 lbs. of butter, 20,285 of tobacco, and 14,739 bales of cotton. There were 495 horses, 1,271 milch cows, 2,060 other cattle, 4,168 sheep, and 6,828 swine. Capital, Jasper. **III.** A W. county of Alabama, bordering on Mississippi, and drained by the Tombigbee and its branches; area, about 1,050 sq. m.; pop. in 1870, 17,690, of whom 9,638 were colored. Its surface is uneven, and the soil generally fertile. The chief productions in 1870 were 5,214 bushels of wheat, 254,251 of Indian corn, 19,662 of sweet potatoes, and 8,263 bales of cotton. There were 1,125 horses, 1,546 mules and asses, 6,502 cattle, 4,055 sheep, and 8,339 swine. Capital, Carrollton.

PICKENS. I. Andrew, an American general, born at Paxton, Bucks co., Pa., Sept. 13, 1739, died at Tomassee, Pendleton district, S. C., Aug. 17, 1817. His family removed to South Carolina in his boyhood. In 1761 he served as a volunteer in the expedition led by Col. Grant against the Cherokees; and at the outbreak of the revolution he was made a captain of militia, and rose to the rank of brigadier general. With Marion and Sumter he kept the field at the head of a partisan corps after the state had been overrun by the British. In February, 1779, he defeated a party of 700 loyalists at Kettle creek, and he was at the battle of Stono the same year. At the battle of Cowpens, Jan. 17, 1781, he commanded the militia. For his conduct on this occasion congress voted him a sword. In June he took the British forts at Augusta, Ga., after a siege of two weeks. At the battle of Eutaw Springs he led a brigade of the South Carolina militia. He led a successful expedition against the Cherokees in 1782, and was subsequently engaged in the negotiation of treaties with the Indians. He was elected to the legislature, and to the convention by which the constitution of the state was adopted. In 1794 he was chosen a member of congress; subsequently served again in the state legislature; and in 1801 retired from public life. **II. Francis W.,** an American statesman, grandson of the preceding, and son of Gov. Andrew Pickens, born in Toogadoo, St. Paul's parish, S. C., April 7, 1807, died in Edgefield, Jan. 25, 1869. He studied law, and commenced practice in Edgefield district. In 1832 he was elected to the legislature, and as chairman of a sub-committee made a report denying the sovereign authority of congress. He was a member of congress in 1834–'44, and in 1844 was elected to the South Carolina senate, where he opposed the secession demonstration called the "Bluffton movement." He was a delegate to the Nashville southern convention in 1850–'51. In 1857 he was appointed minister to Russia, and in 1860 was elected governor of South Carolina. Upon the declaration of secession he immediately demanded of Maj. Anderson the surrender of Fort Sumter, and subsequently coöperated earnestly with the confederates. He retired from office in 1862.

PICKENS, Fort. See Pensacola.

PICKEREL. See Pike.

PICKERING. I. Timothy, an American statesman, born in Salem, Mass., July 17, 1745, died there, Jan. 29, 1829. He graduated at Harvard college in 1763, and in 1768 was admitted to the bar. He held many local offices in Salem, and wrote and delivered to Gen. Gage in 1774 the address of the people of Salem on the occasion of the Boston port bill. In August he with other members of the committee of correspondence was arrested at the instance of Gov. Gage, for calling a town meeting on public grievances; but in September the warrant for the arrest was recalled. In 1775 he was appointed one of the judges of the court of common pleas for the county of Essex, and sole judge of the prize court for Suffolk, Essex, and Middlesex. He published in 1775 "An Easy Plan of Discipline for a Militia," which was ordered to be used by the militia of the colony. In the autumn of 1776 he took the command of the regiment of 700 men from the county of Essex. He was present as adjutant general in the battles of Brandywine and Germantown. In 1777 he was a member of the continental board of war, and in 1780 quartermaster general. On the return of peace he engaged in business in Philadelphia as a commission merchant. In 1786 he removed to Wilkesbarre in order to organize the county of Luzerne and adjust the territorial controversy between the state of Pennsylvania and the settlers of the Wyoming valley, on account of whose hostility he experienced great sufferings and dangers. In 1787 he was the delegate from Luzerne co. to the Pennsylvania convention for acting upon the proposed constitution of the United States, and in 1789 to the convention for revising the constitution of Pennsylvania. He negotiated treaties with the Six Nations collectively, and with some of them severally, in 1790, '91, and '94; and in 1793 he was one of a commission to negotiate with the Indians N. W. of the Ohio. In 1792 he again established himself in Philadelphia, having in August of the preceding year been appointed postmaster general. On Jan. 2, 1795, he was transferred to the office of secretary of war, and in December to that of secretary of state. This post he held until May 12, 1800, when he was removed by President Adams. He now retired to his wild lands in Pennsylvania, with the view of bringing a portion of them into cultivation; but his friends in Massachusetts joined in purchasing a large part of the land, in order to enable him to return to his native state, where in 1802 he was appointed chief justice of the court of common pleas for the county of Essex. In 1803 he was elected a senator in congress in place of Dwight Foster, who had resigned; and in 1805 he was reëlected for six years. In 1812 he was appointed a member of the Massachusetts board of war. From 1813 to 1817 he was a member of the United States house of representatives. In the latter part of his life he was president of the Essex agricultural society. He was an ardent federalist in politics and a Unitarian in religion. He published several addresses and reports, and a "Review of the Correspondence between John Adams and William Cunningham," and contributed to various periodicals.—See "Life of Timothy Pickering" (vol. i., by his son Octavius Pickering, Boston, 1867; vols. ii., iii., and iv., by C. W. Upham, 1873). **II. John**, an American scholar, son of the preceding, born in Salem, Feb. 7, 1777, died in Boston, May 5, 1846. He graduated at Harvard college in 1796. In 1797 he was appointed secretary of legation to Portugal, and in 1799 became private secretary to Rufus King, minister at the court of St. James. He returned to Salem in 1801, and was admitted to the bar in 1804. In 1827 he removed to Boston, and in 1829 was appointed city solicitor, which office he held until a short time before his death. He was several times a member of the state legislature, senate, and executive council; and in 1833 he was appointed one of the commissioners to codify the general statutes of Massachusetts. He received the degree of LL.D. from Bowdoin college in 1822, and from Harvard college in 1835. He was a member of the board of overseers of Harvard college from 1818 to 1824, president of the American academy of arts and sciences, and originator and first president of the American oriental society. In 1816 he published a "Vocabulary of Americanisms," and in 1820 communicated to the American academy an "Essay on a Uniform Orthography for the Indian Languages of North America." His most important work was his Greek and English lexicon (1826), which was republished in Edinburgh, and ran through several foreign editions. A revision of the third edition was completed by him just before his death. Among his other writings are "Remarks on the Indian Languages of North America" (8vo, Philadelphia, 1836), and "Memoir on the Language and Inhabitants of Lord North's Island" (4to, Cambridge, 1845). **III. Charles**, an American naturalist, grandson of Timothy Pickering, born in Susquehanna co., Pa., in November, 1805. He graduated at Harvard college in 1823, studied medicine, and was naturalist to the United States exploring expedition under Commander Charles Wilkes, 1838–'42. After the termination of that expedition he went to India and eastern Africa, and published "Races of Man and their Geographical Distribution" (4to, Philadelphia, 1848; republished in London in Bohn's "Illustrated Library," 1850); "Geographical Distribution of Animals and Man" (Boston, 1854); and "Geographical Distribution of Plants" (1861). In 1858 he communicated to the American oriental society an essay on the "Invention of the Art of Writing," and read before the Boston natural history society an essay on "The Stinging Power of the Physalia."

PICKERSGILL. I. Henry William, an English painter, born in London, Dec. 8, 1782, died there, April 25, 1875. In 1826 he was elected a royal academician, and in 1856 became librarian of the academy. He painted the portraits of a great number of distinguished persons, among others that of Robert Vernon, the donor of the Vernon gallery, which is in the South Kensington museum. **II. Frederick Richard,** a painter, nephew of the preceding, born in London in 1820. His first work, "The Brazen Age," in water colors, was exhibited in 1839. For his cartoon of the "Death of King Lear" he received a prize of £100 at the exhibition in Westminster hall in 1843. He also received in 1847 one of the three first class prizes of £500 for his colossal oil painting of the "Burial of Harold," purchased for a similar sum for the house of lords. Among his important works are "Samson Betrayed" (1850), "Love's Labor Lost" (1855), and "Corsairs throwing Dice for their Prisoners" (1867). In 1847 he was elected an associate of the royal academy, and in 1857 an academician.

PICKLES, vegetables of various sorts, as small cucumbers, onions, string beans, and cabbage, and also some fruits, such as melons, peaches, India mangoes, and soft unripe nuts, preserved in vinegar to be eaten as a condiment. The articles are steeped or parboiled in brine and then transferred to the vinegar, to which some salt is added, and some of a variety of spices are also introduced, as well as mustard, horse radish, &c. East India pickles are flavored with curry powder mixed with mustard and garlic. For some articles the vinegar is used cold, for others hot, and for onions pure distilled vinegar is employed in order that their natural whiteness may be preserved. The use of pickles is so general that they are almost one of the common necessaries of life; and among seafaring men especially their consumption is prodigious. They are often contaminated with a poisonous salt of copper, which is intentionally introduced to give them a pleasant bright green color. To obtain this effect the vinegar is boiled in brass or copper vessels, or copper coins are introduced into the boiling liquid, and sometimes verdigris and blue vitriol or the sulphate of copper. This salt is produced by boiling vinegar which contains sulphuric acid in copper vessels, and most of the vinegar that is used in the pickle factories is of this character. Dr. Hassall reports that 23 samples of pickles examined by him all contained copper to some extent, and two or three of them in dangerous quantities. Sulphuric acid also was detected in 19 out of 20 samples of vinegar used for pickling. Numerous fatal cases of poisoning are reported as having occurred from the use of such pickles. The presence of copper may be suspected in all pickles of a brighter green color than the vegetables naturally possess; and it is proved when a bright piece of iron immersed for a short time in the liquid becomes coated with copper; or if, when a bit of the pickles is minced fine and put into a vial with liquid ammonia diluted with an equal amount of water, the liquid becomes blue, it is owing to the presence of copper.

PICO DELLA MIRANDOLA. See MIRANDOLA.

PICOT, François Édouard, a French painter, born in Paris in 1786, died there, March 15, 1868. He studied under Vincent, and obtained in 1818 the first great prize of the school of fine arts for his picture of "The Death of Jacob," which enabled him to spend several years in Rome. After his return to Paris he exhibited "The Death of Sapphira" and "Amor and Psyche," and several allegorical paintings for the Louvre. In 1830 he was appointed painter to the government, and executed various works at Versailles, of which the best known are his portrait of Talma and "The Entrance of the Duke of Guise into Calais." In 1836 he was elected to the academy of fine arts.

PICOU, Henri Pierre, a French painter, born in Nantes, Feb. 27, 1824. He studied under Delaroche. His best known works are "Cleopatra spurned by Octavius" (1853); "Love at Auction," and "The Harvest of Love" (1855); "The Night of Cleopatra," and "The first Kiss" (1867); "Molière at Versailles," "The Bath," and "Moses on the Banks of the Nile" (1870); and "Psyche in the Lower Regions," and "The Night Watch" (1873).

PICRIC ACID (Gr. πικρός, bitter; called also carbazotic, trinitrophenic, and nitrophenisic acid), a frequent product of the action of nitric acid upon complex organic substances. Carbolic acid, salicine, coumarine, phloridzine, silk, indigo, and a variety of resins yield it when treated with fuming nitric acid. The most economical raw material is the tar oil which distils over between 302° and 392° F. It can also be conveniently made from carbolic acid. In preparing it on a large scale, Grace Calvert allows 7 lbs. of carbolic acid to fall drop by drop into 42 lbs. of nitric acid of specific gravity 6·52. After the lapse of about 36 hours, the whole of the carbolic acid having been introduced, heat is applied, and the acid liquor is concentrated to one fourth of its bulk; on cooling it becomes solid. It is dissolved in water and allowed to crystallize. Picric acid crystallizes in long, pale, yellow, brilliant, rectangular plates, soluble with difficulty in cold, readily in hot water, and also soluble in alcohol, ether, and benzole. The acid has an intensely bitter taste, which has led some persons fraudulently to substitute it in beer for a portion of the hops. It is employed for dyeing wool and silk yellow; and with aniline green, indigo, and Berlin blue, it is used for dyeing silk and wool green. In France extensive use is made of the acid for the manufacture of the picrate gunpowder.

PICTET, François Jules, a Swiss naturalist, born in Geneva about 1800, died there in April, 1872. He was professor of zoölogy and anatomy in the academy of Geneva, and besides many other works published *Traité élémentaire de paléontologie* (4 vols., Geneva, 1844–'6), and *Mélanges paléontologiques* (1863).—Among many of his relatives of scientific eminence is Adolphe Pictet (born in 1799), professor of æsthetics and linguistics at Geneva, and author of *Les origines indo-européennes, ou les Aryas primitifs* (2 vols., 1859–'63).

PICTOR, Fabius. See Fabius, vol. vii., p. 52.

PICTON, a town, port of entry, and the capital of Prince Edward co., Ontario, Canada, situated on the bay of Quinté, 115 m. E. by N. of Toronto; pop. in 1871, 2,361. It contains manufactories of iron castings, steam engines, machinery, &c., a brewery, a pottery, a tannery, saw and grist mills, a branch bank, about 60 stores, three weekly newspapers, and churches of five denominations. The value of imports for the year ending June 30, 1874, was $26,840; of exports, $178,400.

PICTOU. I. A N. E. county of Nova Scotia, Canada, bordering on Northumberland strait; area, 1,126 sq. m.; pop. in 1871, 32,114, of whom 27,165 were of Scotch, 1,974 of Irish, 1,719 of English, and 758 of Swiss origin or descent. The surface is generally level, and is intersected by numerous streams. The soil is very fertile. The county contains limestone and rich mines of coal and iron ore. It is traversed by the Pictou branch of the Intercolonial railway. **II.** A town, capital of the county, at the head of a harbor of its own name, opening into Northumberland strait, and at the E. terminus of the Pictou branch of the Intercolonial railway, 80 m. N. N. E. of Halifax; pop. in 1871, 3,462. It is situated in a fertile and well cultivated district, containing extensive coal mines and quarries of building stone, and is well built and lighted with gas. The harbor is very fine. At the S. side of its entrance is a lighthouse, with a fixed light 65 ft. above the sea. Large quantities of coal are exported. The value of imports for the year ending June 30, 1874, was $375,136; of exports, $266,310. The number of entrances was 238, tonnage 102,192; clearances 218, tonnage 79,953. The town contains two steam carding mills, two tobacco factories, an iron foundery, several saw and grist mills, tanneries, &c., three branch banks, a number of stores, an academy, a library, a weekly newspaper, and several churches.

PICTS, an ancient people of North Britain, inhabiting the E. coast and lowlands of Scotland. They are supposed to have been identical with the ancient Caledonians; the name Picti (painted), probably derived from their custom of painting their bodies, occurs first in a speech of the rhetorician Eumenius, A. D. 296, to the emperor Constantius Chlorus on his return from the victory over Allectus. After this they are frequently spoken of by Roman historians, and Ammianus Marcellinus in the annals of the year 368 says that they were divided into the Dicalidonæ and Vecturiones. Their incursions proved very troublesome to the Roman portions of the island. The southern Picts were converted to Christianity under the preaching of St. Ninian early in the 5th century; the northern Picts by St. Columba late in the 6th century. They suffered severely for centuries from the invading Scots of Ireland, whose king Kenneth II. finally subdued them in 843, thus making all Scotland for the first time subject to one king, and fixed his residence at Forteviot in Stratherne, the Pictish capital. It has been a subject of dispute whether they were of Celtic or Teutonic descent. Their language bore some resemblance to the Welsh, and it was the opinion of Camden that the modern Welsh are of Pictish origin. Singular architectural remains still exist in various parts of Scotland, which are popularly called Picts' houses.

PIE, Louis François Désiré Édouard, a French bishop, born at Pontgouin, Eure-et-Loire, Sept. 26, 1815. Soon after his ordination he was appointed vicar general of Chartres, and on May 23, 1849, he became bishop of Poitiers. Though warmly attached to the legitimist party, he gave at first a qualified adhesion to Napoleon III.; but in refuting, in 1861, La Guéronnière's pamphlet *La France, Rome et l'Italie*, he compared Napoleon III. to Pontius Pilate, responsible for the death of Christ. He was summoned to answer for this offence before the council of state, but refused to appear. In 1869 he took a prominent part in advocating a speedy declaration of pontifical infallibility; and in the Vatican council he was the leader of the French infallibilists, and reported back to the council, May 14, 1870, the *schema* on the primacy of St. Peter and the official infallibility of his successors. His principal publications are: *Instruction synodale sur les erreurs de la philosophie moderne* (Poitiers, 1855); *Discours et instructions pastorales* (3 vols. 8vo, 1858–'60); *Instruction synodale sur les principales erreurs du temps présent* (1864); and two series of discourses and pastoral instructions in vol. xvi. of Migne's *Collection des orateurs sacrés*.

PIEDIMONTE D'ALIFE, a town of S. Italy, in the province and 20 m. N. by E. of the city of Caserta, at the foot of Monte Matese; pop. about 8,000. It is remarkable for its mountain scenery, has many cotton mills, and produces excellent oil and wine. The Laurenzana palace is the most remarkable building. The town is said to be built from the ruins of the neighboring ancient Samnian city of Allifæ, at present the site of the small town of Alife.

PIEDMONT (It. *Piemonte*, from *piè di monte*, foot of the mountain), a N. W. division of Italy, bounded N. by Switzerland, E. by Lombardy and Piacenza, S. by Liguria, which separates it from the Mediterranean, and W. by France; area, 11,301 sq. m.; pop. in 1872, 2,899,564, nearly all Catholics excepting 30,000 Waldenses. Piedmont and Liguria, including Genoa and Porto Maurizio (area 2,056 sq. m., pop. 843,812), have been lately united, making the aggregate area 13,357 sq. m., and the population 3,743,376. Piedmont proper contains the provinces of Alessandria, Coni or Cuneo, Novara, and Turin. It is enclosed on three sides by stupendous mountains, and completely drained by the Po and its numerous tributaries. In the intense heat of summer the ground of the plains toward Lombardy becomes so scorched that crops are only saved by a system of irrigation which is developed to great perfection. Half a million acres are scored with artificial channels; for the privilege of using the water a tax is levied. Thus districts once waste have been reclaimed and made very productive. The region of the Po is exceedingly rich in cereals, wine, oil, and fruits. Excellent silk is exported in large quantities, and is manufactured to some extent, along with wool, linen, and other articles. Piedmont has shared the vicissitudes of the house of Savoy, and once was a principality. The name was long used to designate in a general sense the Sardinian states, though the region was merged in the kingdom of Sardinia in the 18th century, and in that of Italy in 1861. (See Italy, Sardinia, and Savoy.)

PIEGANS, a tribe of American Indians belonging to the Blackfeet nation, now in Montana. They derive their name from a chief named Piegan ("the Pheasant"), under whom they separated from the main body of the Blackfeet. They were originally between the Milk and Marias, on the Marias and Teton, and between the last named river and the Missouri. The lower band was the largest and best; the northern band were nearer the British line. The Piegans were the most civilized and warlike of the Blackfeet; they dressed comfortably and even gaudily, their ornaments of porcupine quills distinguishing them from the others. They used bows extremely short, not more than 2½ or 3 ft. long, made of ash, bone, or horn, and were constantly at war with the Crows, Flatheads, Gros Ventres, and other tribes. After two treaties had failed, a final one was made Sept. 1, 1868, ceding lands, the government agreeing to pay $1,000,000 in instalments of $50,000, and to meet debts of traders estimated to amount to $75,000. Although the Piegans remained generally peaceful, occasional collisions occurred. Lieut. Col. Baker was sent against them in the winter, and on Jan. 23, 1870, he surprised Red Horn's camp on the Marias, killing 173 men, women, and children. This massacre excited general censure throughout the country. They have since lost heavily by smallpox. Their reservation was narrowed down by act of April 15, 1874, which took away their best hunting and pasture lands. In 1874 they were estimated at 2,450 in 350 lodges. Their attempts at cultivation have failed from a variety of causes. Roman Catholic missions were begun in 1846, and were kept up; but in the religious division, the Blackfeet and the kindred tribes were assigned to the Methodists. They have a school with 26 pupils.

PIERCE. **I.** A S. E. county of Georgia, intersected by the Satilla river; area, about 500 sq. m.; pop. in 1870, 2,778, of whom 814 were colored. The surface is low and mostly level. Along some of the rivers there are swamps. It is traversed by the Atlantic and Gulf and the Brunswick and Albany railroads. The chief productions in 1870 were 33,896 bushels of Indian corn, 14,506 of oats, 30,960 of sweet potatoes, 250 bales of cotton, and 56,370 lbs. of rice. There were 371 horses, 2,242 milch cows, 5,654 other cattle, 2,292 sheep, and 7,928 swine. Capital, Blackshear. **II.** A W. county of Wisconsin, bounded W. by the St. Croix and S. W. by the Mississippi, and drained by the Rush and other rivers; area, about 600 sq. m.; pop. in 1870, 9,958. It has a broken surface covered by prairie and forest, and the soil is fertile. The chief productions in 1870 were 331,129 bushels of wheat, 81,353 of Indian corn, 171,393 of oats, 24,551 of barley, 47,512 of potatoes, 121,038 lbs. of butter, and 7,245 tons of hay. There were 1,562 horses, 2,436 milch cows, 3,828 other cattle, 3,586 sheep, and 3,138 swine; 7 manufactories of carriages and wagons, 3 of sash, doors, and blinds, 6 flour mills, and 9 saw mills. Capital, Ellsworth. **III.** A N. E. county of Nebraska, intersected by the N. branch of Elkhorn river; area, 540 sq. m.; pop. in 1870, 152. The surface is undulating and the soil productive. Capital, Pierce. **IV.** A W. county of Washington territory, having Puget sound on the west and the Cascade mountains on the east, bounded S. W. by the Nisqually river, and intersected by the Pugallup; area, 2,000 sq. m.; pop. in 1870, 1,409. Mt. Rainier, the loftiest peak of the Cascade range, is in the S. part. The rivers are navigable for some distance, and there are numerous good harbors. The surface is diversified, consisting of prairies, forests, and rugged mountains. It is traversed by the Pacific division of the Northern Pacific railroad. The chief productions in 1870 were 9,181 bushels of wheat, 14,399 of oats, 13,396 of potatoes, 27,559 lbs. of wool, 19,535 of butter, and 1,304 tons of hay. There were 541 horses, 890 milch cows, 1,622 other cattle, 7,769 sheep, and 684 swine. Capital, Steilacoom.

PIERCE, Franklin, the fourteenth president of the United States, born in Hillsborough, N. H., Nov. 23, 1804, died in Concord, Oct. 8, 1869. His father, Gen. Benjamin Pierce, served throughout the revolutionary war, and in 1827 and 1829 was governor of New Hampshire.

Franklin Pierce graduated at Bowdoin college in 1824, and studied law at Portsmouth, afterward in the law school at Northampton, Mass., and at Amherst, N. H. He was admitted to the bar in 1827, and began practice at Hillsborough. He was an ardent advocate of the election of Gen. Jackson to the presidency. From 1829 to 1833 he represented the town of Hillsborough in the state legislature, and in the last two years was speaker of the house. In 1833 he was elected to congress, where he served on the judiciary and other important committees. He opposed the policy of internal improvements, the bill authorizing an appropriation for the military academy at West Point, and all anti-slavery measures. He remained a member of the house of representatives till 1837, when he was elected to the United States senate, of which he was the youngest member, being barely of the legal age. In 1842 he resigned his seat and returned to the practice of his profession at Concord, to which place he had removed from Hillsborough in 1838. In 1846 President Polk offered him the post of United States attorney general, which he declined. He also declined the democratic nomination for governor. He supported the annexation of Texas, in opposition to a considerable portion of the democracy of New England, and in 1847 he enrolled himself a member of one of the first volunteer companies of Concord. On the passage by congress of the bill for the increase of the army he became colonel of the ninth regiment, and shortly after was commissioned brigadier general, and joined the army under Gen. Scott at Puebla, Aug. 7, after several sharp engagements with guerillas on the way. In the battle of Contreras he was severely hurt by the falling of his horse, but continued during the day at the head of his brigade. In the battle of Churubusco, while leading his men against the enemy, he fell fainting from the pain of his injuries, but refused to quit the field. After the battle Gen. Scott appointed him one of the commissioners to arrange the terms of an armistice. In December, the war being ended, he returned home, resigned his commission, and resumed the practice of the law. In 1850 he presided over the constitutional convention of New Hampshire. In 1852 the democratic national convention assembled at Baltimore, and after 35 ballotings for a candidate for president of the United States, the Virginia delegation brought forward the name of Gen. Pierce, and on the 49th ballot he was nominated by 282 votes to 11 for all other candidates. His principal competitors were James Buchanan, Lewis Cass, W. L. Marcy, and S. A. Douglas. At the ensuing election he received the votes of all the states except Massachusetts, Vermont, Kentucky, and Tennessee, whose suffrages were given to Gen. Winfield Scott. Of the votes of the electoral colleges Pierce received 254 and Scott 42. In his inaugural address, March 4, 1853, President Pierce maintained that slavery was recognized by the constitution, and that the fugitive slave law was constitutional and should be strictly executed, and denounced in strong terms the agitation of the slavery question. His cabinet, which was not changed during his administration, was as follows: William L. Marcy of New York, secretary of state; James Guthrie of Kentucky, secretary of the treasury; Jefferson Davis of Mississippi, secretary of war; James C. Dobbin of North Carolina, secretary of the navy; Robert McClelland of Michigan, secretary of the interior; James Campbell of Pennsylvania, postmaster general; Caleb Cushing of Massachusetts, attorney general. Among the more important events of his administration were the dispute respecting the boundary between the United States and Mexico, resulting in the acquisition of Arizona; the exploration of the routes proposed for a railroad from the Mississippi to the Pacific; the amicable settlement of a serious dispute with Great Britain about the fisheries; the affair of Martin Koszta (see INGRAHAM, DUNCAN NATHANIEL); the repeal of the Missouri compromise, and the organization of the territories of Kansas and Nebraska under the Kansas-Nebraska act; the Ostend conference (see BUCHANAN, JAMES); the treaty negotiated at Washington in 1854 between the United States and Great Britain, providing for commercial reciprocity between this country and the Canadian provinces; the treaty with Japan negotiated in the same year by Commodore Perry; the filibustering invasion of Nicaragua by William Walker; the dismissal of the British minister at Washington, and the British consuls at New York, Philadelphia, and Cincinnati, because of their complicity in the illegal enlistment of recruits for the British army; and the troubles in Kansas. (See KANSAS.) President Pierce signed bills to reorganize the consular and diplomatic system of the United States; to organize the court of claims; to provide a retired list for the navy; and to confer the title of lieutenant general on Winfield Scott. He vetoed bills for the completion and improvement of certain public works; appropriating public lands for the relief of the indigent insane; for the payment of the French spoliation claims; and increasing the subsidy of the Collins line of steamships. On Jan. 24, 1856, he sent a message to congress in which he represented the formation of a free-state government in Kansas as an act of rebellion, and justified the principles of the Kansas and Nebraska act. At the democratic national convention in June he was a candidate, but after several ballotings Mr. Buchanan was nominated. Before the adjournment of congress in August, 1856, the house of representatives made an amendment to the army appropriation bill, providing that no part of the army should be employed to enforce the laws made by the territorial legislature of Kansas, until congress should have decided that it was a valid legislative assembly. The senate refused to concur in this proviso, and congress adjourned without making any provision for the support of the army. The president immediately issued a proclamation calling an extra session to convene on Aug. 21, when the army bill was passed without any proviso, and immediately afterward congress adjourned. Pierce's message on the assembling of congress in December was chiefly devoted to the subject of Kansas, and in its citation of events and expressions of praise it took strong grounds against the free-state party of the country. Soon after the close of his administration, March 4, 1857, Mr. Pierce visited Madeira, and afterward made a protracted tour in Europe, returning home in 1860. During the civil war he made in Concord a speech, still known as the "mausoleum of hearts speech," expressing sympathy with the confederates.—The life of Franklin Pierce, to the period of his nomination as candidate for the presidency, was written by Nathaniel Hawthorne, his college classmate (Boston, 1852).

PIERCE, George Foster, a bishop of the Methodist Episcopal church, South, born in Greene co., Ga., Feb. 3, 1811. He graduated at Franklin college in 1829, and began to study law, but entered the Georgia conference at Macon in 1830. With the exception of the year 1834, during which he was stationed in Charleston, S. C., he labored in the regular ministry in his native state till 1838–'9, when he became first president of the Georgia female (now Wesleyan) college in Macon. While here he edited jointly with P. Pendleton the "Southern Lady's Book." In 1848 he was elected president of Emory college, Ga., and continued in that office until his election to the episcopacy at the general conference in Columbus, Ga., in 1854. His present residence (1875) is at Sparta, Ga. He is the author of "Incidents of Western Travel," edited by T. O. Summers (1857).

PIERER. I. Johann Friedrich, a German publisher, born in Altenburg, Jan. 22, 1767, died there, Dec. 21, 1832. He began the study of law, but afterward studied medicine, and settled as a physician in his native city. In 1801 he founded the *Literarisches Comptoir*, a bookselling establishment, which he gave up in 1816 to F. A. Brockhaus, but resumed in 1823, giving it the name *Literatur-Comptoir*. He assisted in the edition of the *Encyklopädisches Wörterbuch*, edited by his son. He founded the *Medicinische Nationalzeitung* (1798) and the *Allgemeine medicinische Annalen des* 19. *Jahrhunderts* (1800), and published an edition of the works of Hippocrates (Altenburg, 1806). **II. Heinrich August,** son of the preceding, born in Altenburg, Feb. 26, 1794, died May 12, 1850. In 1811 he studied medicine at Jena, and in 1813 joined the army, rose to the rank of major, and resigned in 1831. In 1824 he became editor of the *Encyklopädisches Wörterbuch* (26 vols., Altenburg, 1824–'36), and afterward, having taken charge of his father's publishing house in his own name, published a new edition (34 vols., 1840–'46). His sons and successors, Victor and Eugen, published a third edition under the title of *Universal-Lexikon* (17 vols., Altenburg, 1849–'52), a fourth in 1857–'65, and a fifth in 1869 *et seq.* A sixth was commenced in 1873 at Oberhausen by Adolph Spaarmann, successor of the Pierers, but suspended, and resumed in 1875.

PIERPONT, John, an American poet, born in Litchfield, Conn., April 6, 1785, died in Medford, Mass., Aug. 27, 1866. He graduated at Yale college in 1804, and in 1805 went to South Carolina as a private tutor. Returning to Connecticut in 1809, he studied law in the school at Litchfield, and settled at Newburyport, Mass., where he delivered before the Washington benevolent society his poem of "The Portrait." He afterward unsuccessfully tried mercantile pursuits in Boston and Baltimore. In 1816 he published at Baltimore "Airs of Palestine," a poem, and soon after began the study of theology, completing his course in the Harvard divinity school. In 1819 he was ordained minister of the Hollis street Congregational church in Boston. He was an ardent advocate of various reforms, which led to his retirement from his church in Boston in 1845. He then became pastor of the Unitarian church in Troy, N. Y., and in 1849 of the first Congregational church in Medford, Mass., which charge he resigned in 1856. On the outbreak of the civil war in 1861 he entered the army as chaplain of a Massachusetts regiment, but soon received an appointment in the treasury department at Washington, which office he retained until his death. In 1840 he published "Airs of Palestine, and other Poems." At the Litchfield centennial celebration of 1851 he delivered a long poem. He published several school readers, and about 20 sermons and addresses.

PIGAULT-LEBRUN, a French author, whose real name was CHARLES ANTOINE GUILLAUME PIGAULT DE L'ÉPINOY, born in Calais, April 8, 1753, died at La Celle Saint-Cloud, July 24, 1835. He was treated with great rigor by his father, an influential magistrate, who connived with the local authorities in announcing his son's death because he had married a girl of the working classes. An appeal to parliament resulted only in the confirmation of his death by that body, when he assumed the surname Lebrun. He was one of the most successful as well as most licentious writers of his day. His more important works (part of which he translated into Spanish) are comprised in his *Œuvres complètes* (20 vols., Paris, 1822–'4). He also published *Histoire de France abrégée à l'usage des gens du monde* (8 vols., 1823–'8), extending to the death of Henry IV.

PIGEON, an extensive family of rasorial birds, by some ornithologists raised into an order, characterized by a short, straight, compressed bill, with the apical half vaulted and strong, and the base comparatively weak and covered with a fleshy membrane in which the nostrils are placed; wings moderate; tarsi more or less long and robust, and the toes long, divided, and padded beneath. Most pigeons are perchers, and this family may be regarded as forming the connecting link between the gallinaceous and insessorial birds. Their geographical distribution is very extensive, species being found in every part of the world except in the frigid zones; but their favorite habitats are tropical southern Asia and the islands of the Indian archipelago. They generally nest on trees, laying two whitish eggs on which both parents sit in turn; the young are covered with a thin hairy-like down, and are fed in the nest till able to fly, at first by a milky half-digested substance disgorged by the old birds. The flight is generally rapid and powerful, and capable of being long sustained, as in the carrier pigeon; in the more rasorial types the wings are shorter and rounded, and the flight is abrupt, low, and of short continuance. They are generally wild and timorous, and, with the exception of the common pigeon and turtle dove, have not been domesticated. The voice consists of a guttural cooing, at times plaintive and tender, at others harsh and unpleasant, and is mostly confined to the males in the breeding season; the colors are usually brilliant and beautifully diversified; their flesh is wholesome, nutritious, well flavored, juicy, and high-colored. The family includes the subfamilies *columbinæ* or pigeons proper, *treroninæ* or tree pigeons, *gourinæ* or ground pigeons, *didunculinæ* or tooth-billed pigeons, and *didinæ*, of which the dodo is the only representative. (See Dodo.)—In the *columbinæ* the bill is moderate and slender, and acute at the tip; the nostrils a longitudinal slit; wings moderate and pointed; tail of various lengths, generally rounded; tarsi short, toes long, hind one about the length of the tarsus. In the typical genus *columba* (Linn.) the prevailing color is bluish gray, of different shades, with feathers of a peculiar form and metallic lustre upon the neck; their feet are formed for walking as well as perching, and they generally seek their food upon the ground; they eat principally grains, acorns, and other nuts, and some tender leaves and plants. There are more than 30 species scattered over the globe; generally seen in pairs in summer, they collect in large flocks at the beginning of winter, sometimes migrating to milder climates; they are fond of rocky places, especially on the coasts of Great Britain, Africa, and Asia, where they build rude nests. The common pigeon or dove is derived from the wild rock pigeon or biset (*C. livia*, Linn.); in its wild state it lives in caverns and holes in the rocks of the coast, and never in the woods or upon trees; it swarms about the Orkney islands and the Hebrides and on the rocky islands of the Mediterranean. Man substitutes an artificial dove cot for the natural cavern, in which the pigeons rear their young for his benefit; the birds, however, generally depend for support on their own exertions, and enjoy so perfect a freedom of action that they can hardly be said to be domesticated. This species may be known from the wood and ring pigeons by the two broad and distinct black bars across the closed wings, the white of the lower part of the back, and the broad black bar at the end of the tail. Beyond doubt this is the species known to the ancients, which from time immemorial has been regarded with peculiar affection by mankind, as the emblem of gentleness and affection. From the affectionate intercourse between the sexes, it was sacred to Venus, and was her constant attendant. The pigeon is interesting to the comparative physiologist from the fact that the parent birds nourish the young with the curd-like contents of the crop, secreted by special glands like the milk in mammalia, with this remarkable difference, that it is secreted by both sexes, and even most abundantly by the male. It was discovered by Hunter that the crop, thin and membranous in the ordinary condition, becomes thickened and enlarged in the breeding season, more vascular, with an irregular glandular appearance on the interior; the secretion of these glandulæ soon coagulates into a granulated white curd, so that the old joke about "pigeon's milk" is not without foundation; a young pigeon, like a young mammal, will die if deprived of its parents in the first week of its life. Pigeons do not drink in the manner of ordinary birds, but by a long, continuous draught, without raising the head until the thirst is satisfied. There are numerous varieties or breeds highly prized by the pigeon fancier; they have all originated from a few accidental varieties of the common species, isolated and carefully bred by man, and not from hybrid crossings with other species either allied or remote. As far as known, they are permanent when bred in and in, and, if permitted to breed indiscriminately with each other, produce a fertile offspring. Such varieties require the utmost care to keep them from degenerating, and have so far lost their natural instincts and desire for liberty that they have become nearly dependent on man for their support, having in great measure lost the faculty of providing for themselves. Mr. Darwin has drawn from them some of his strongest arguments in favor of the origin of species by natural selection. Among the numerous varieties of this species may be mentioned the fantail, Jacobine, pouter, tumbler, and carrier pigeon, the last of which has been described under its title. The fantails are so called from the great number of the tail feathers, their erectile power and singular trembling motion; they are small, awkward fliers, and very apt to be overset by the wind; when pure the color is generally white, sometimes with a black head and tail. The Jacobine pigeon has a ruff of raised feathers forming a kind of hood like that of a monk; it is small, but light and elegant, with white head, wings, and tail, and reddish brown hood, back, and breast; some highly prized specimens are pure white; it is very prolific, a poor flier on account of its hood, and generally keeps much at home. The pouter or cropper is so called from its faculty of inflating the œsophagus to an extent sometimes equal to the size of the body; this inflation subjects the bird to many inconveniences, diseases, and fatal accidents, and hence, though of handsome plumage, it is not much esteemed by fanciers; it is also unproductive; the prevailing color is reddish brown. The tumbler is so called from its habit of rolling over and over in the air before alighting. The Turkish pigeon, of the same race as the carrier, is large, with a bill tuberculated at the base, and the eyes widely surrounded by naked red skin. The cushat or ring pigeon (*C. palumbus*, Linn.) is widely distributed over Europe and northern Asia and Africa, even where the winters are severe; it is an arboreal species, perching, roosting, and nesting upon trees, keeping a vigilant watch in the daytime; the eggs are two, white, and hatched out in 17 or 20 days; two broods are raised in a year. It is a large species, measuring 16 or 17 in. in length; the sides of the neck are glossed with green, bounded by a patch of white which nearly meets behind, forming a half collar; the breast and abdomen purplish red, with the outer ridge of the wing and some of the greater coverts white. The wood pigeon (*C. œnas*, Linn.) is smaller and of more limited distribution, found principally in well wooded districts, migrating to the south in winter; its habits resemble those of the ring pigeon; it is about 14 in. long, with an alar extent of 26 in.; the general color is bluish gray, with the sides of the neck golden green, the fore neck and breast pale vinous, and the outer web of the secondaries and some of their coverts with a spot of black, not forming bars as in the rock pigeon. Neither of the last two species has been domesticated, and neither will breed with the rock pigeon, nor with their own species in captivity. There are several wild species of *columba* in the United States, as the band-tailed pigeon (*C. fasciata*, Say), about 15 in. in length, found from the Rocky mountains to the Pacific, and as far south as Mexico; the red-billed pigeon (*C. flavirostris*, Wagl.), of the lower Rio Grande, 14 in. long and 22 in. in alar extent; and the white-headed pigeon (*C. leucocephala*, Linn.), a little smaller, inhabiting the Indian and other southern Florida keys and the West Indies. —The passenger pigeon (*ectopistes migratoria*, Swains.) has been described under that title. In the genus *carpophaga* (Selby), embracing the fruit pigeons, the bill has a large and prominent soft basal portion, beneath which the nostrils are situated; the second, third, and fourth quills nearly equal and longest; tail lengthened and generally rounded; tarsi very short, and clothed with down below the knee. There are about 30 species, found in the forests of India, Australia, and the islands of the Indian and Pacific oceans; they live on the branches of the highest trees, feeding on fruits and berries; their colors are green, yellow, and purple, with bronzed and metallic reflections. One of the handsomest of this beautiful group is the nutmeg pigeon (*C. ænea*, Selby), about 18 in. long, inhabiting India and its archipelago; the general color is a fine pale bluish gray, with golden green back, wings, and tail, and deep chestnut under tail coverts. In this and the allied species the metallic lustre of the plumage changes with every motion, rivalling the hues of the humming birds. They feed on nutmegs, figs, and in Australia on the top leaves of the cabbage palm; the nutmegs are swallowed whole, the external envelope or the mace digested, and the hard nut voided not only uninjured but the better prepared for germination in the soil on which it is dropped; in this way the nutmeg has been extensively disseminated through the East Indian islands; on this food the flesh becomes very fat and highly flavored. The genera *turtur* and *œna* of this subfamily will be noticed under Turtle Dove.—In the subfamily *treroninæ* or tree

Ring Pigeon (Columba palumbus).

Nutmeg Pigeon (Carpophaga ænea).

pigeons belong the genera *ptilonopus* (Swains.) and *treron* (Vieill.) or *vinago* (Cuv.); in these the bill is short, with the tips of both mandibles of nearly equal thickness, the tarsi very short and more or less feathered, and the toes divided at the base, with short and curved claws. In the genus *ptilonopus* or the turtelines the bill is slender, the wings moderate, the third quill the longest and the first with the end suddenly narrowed for some distance, and the tail moderate and even. These showy birds are found in the tropical deep forests of India, Australia, and the Pacific islands; they are of solitary habits, feeding on fruits, especially that of the banian. In the genus *treron* the bill is stout, the second and third quills nearly equal and longest, with the third notched on the inner web near the middle; tail rounded, or lengthened and wedge-shaped; there are about 20 species, inhabiting India and its archipelago and Africa; they are arboreal, wild, living in flocks, and feed on fruits and berries; the flight is rapid and low. These thick-billed pigeons vie with the parrots in the diversified colors of their plumage, the prevailing hues being green and yellow, with purplish and reddish patches; they luxuriate amid the foliage of the banian and other tropical trees; their colors are so nearly those of the leaves among which they dwell, that it is very difficult to detect them; their feet resemble those of a parrot, and they climb among the branches very much like this scansorial bird.—In the *gourinæ* or ground pigeons the toes are usually long and strong, and adapted for progression on the ground; the wings are generally short and rounded, and sometimes concave as in the partridges, and the legs long; approaching the gallinaceous birds in these respects, they differ from them in having, like the other doves, very short cæca; they run with great rapidity, but the flight is low and labored; the colors are more uniform and less brilliant than in the preceding subfamilies, though some of the members are very handsome. The genus *zenaida* (Bonap.) has few species, and they are chiefly confined to the West India and Galápagos islands, whence they sometimes wander to the Florida keys; they seek their food on the ground, and when alarmed fly off with a whistling noise. The zenaida dove (*Z. amabilis*, Bonap.) is about 11 in. long and 18 in. in alar extent; the prevailing color above is reddish olive tinged with gray, with a purplish hue on the head and under parts; inside of wings and sides blue; quills brown, secondaries tipped with white, and the tail with a subterminal black bar. The keys skirted with mangroves used to be their favorite breeding places, hence called pigeon or dove keys; the nest is made on the ground, and more compact than is usual with pigeons; the flesh is excellent; the food consists of seeds, aromatic leaves, and berries, some of which are acrid and poisonous to man; the cooing is very soft and melancholy. In the genus *calænas* (Gray), the bill is strong and much curved at the tip, wings long and pointed, and tail moderate and even; tarsi very robust; base of upper mandible covered with a wattle, and feathers of the neck long. These birds inhabit the Indian archipelago, running on the ground with great quickness, and perching on the lower branches of trees. The Nicobar pigeon (*C. Nicobarica*, Gray) is one of the most beautiful of the family in its colors, though its heavy body, pendent tail, and concave wings show its affinity with rasorial birds; it is about 15 in. long; the plumage is rich metallic green, changing with the light into golden, coppery, and purplish red; the tail is pure white, and the quills blackish blue with greenish reflections. In the genus *verrulia* (Flem.) belongs the carunculated pigeon of S. Africa (*V. carunculata*, Flem.); the bill is slender, the wings long, and the tail short; there is a pendulous wattle under the throat, and a naked hanging band on the sides of the neck; it comes in these respects the nearest to the *gallinæ*, and also, like the preceding genus, lays six or eight eggs instead of the usual two of the pigeons, and the young immediately follow their parents, who keep them together by a peculiar cry; the food consists of grain, berries, and insects; the upper parts are gray, with a purple tinge on the head and neck; the under parts white, and the tail reddish brown. In the genus *starnænas* (Bonap.) belongs the blue-headed pigeon (*S. cyanocephala*, Bonap.) of the West Indies and the southern keys, about 10¾ in. long; it is retired and solitary, and lays several eggs in a nest on the ground; the young are said to follow the parents as soon as hatched. In the genus *goura* (Flem.) belong the large crowned pigeons of Papua and the Indian archipelago; the head is ornamented with a large compressed crest. The crowned pigeon (*G. coronata*, Steph.) is the largest of the family, being 27 or 28 in. long; the bill is 2 in. long and black; the crest is composed of long silky barbules plumed at the end, which, with the head, neck, and lower parts, are grayish blue; back with the feathers black at the base

Nicobar Pigeon (Calænas Nicobarica).

with tips of rich purplish brown; a central broad white bar across the closed wings. This bird seems to connect the pigeons with the curassows and guans; it nests in trees, and lays only two eggs; it is readily tamed, but, like the gaudy Nicobar pigeon, does not propagate in confinement, and can hardly bear the chilly temperature of northern climates; its flesh is excellent for food. This species and the *G. Victoriæ* have hybridized at the London zoological gardens, and have produced a living young one, having sat upon a single egg for 28 days.—The subfamily *didunculinæ* have the bill strong and nearly as long as the head, with the culmen depressed close to the forehead, and then suddenly rising and forming an arch to the acute and overhanging tip; the lower mandible is armed with three distinct angular teeth near the truncated tip; the wings moderate and concave, and the bend armed with a blunt tubercle; the tail short and rounded; tarsi moderate and strong; all the toes long, and with sharp curved claws; bare space around eyes and on each side of throat. The only genus is *didunculus* (Peale), and the only species *D. strigirostris* (Gould), found in the Samoan islands; it is about the size of a common pigeon, of a general blackish glossy green color, with chestnut back and tail, brownish quills, and orange bill. Its wings indicate a considerable power of flight, and it is said to pass most of its time on trees, feeding on berries and fruits; it also seems adapted for movement on the ground, and its bill is suited to digging up bulbous roots or stripping the husks from nuts. They are generally seen in pairs or small flocks; the nest is made among rocks, and the young are born naked and helpless; the flesh is excellent; they are kept as pets by the natives. This is an interesting bird, as showing a living connection of the pigeons with the extinct dodo; many of its characters also bring it near gallinaceous birds, especially the curassows.

Crowned Pigeon (Goura coronata).

PIGEON BERRY. See POKE.

PIGEON ENGLISH (or more correctly pidjin English), a language used in China between the natives and the English-speaking residents. Its origin is referable to the difficulty met by traders in communicating with the Chinese in their own tongue. A few simple words in English were more easily acquired by the Chinese than were their idioms and inflections by foreigners. These words, being accepted at certain values, formed the basis of pidjin English, and thereto have been added other expressions from English as well as from Portuguese, Malay, Hindostanee, &c., the whole forming a dialect utterly beyond the scope of grammar and syntax, but available for everyday commercial and domestic transactions, and concreted into a distinct language. Many of the words are so changed in pronunciation as to be hardly recognizable. *Pidjin* is a corruption of the word business, so that pidjin English is really business English. *Commission* has become *cumshaw*, and from meaning a compensation for services rendered has come to mean a gratuity. To a certain extent the dialect is a mere transference of words from English into Chinese, arranged syntactically according to the Chinese method. "Did you give the gentleman my letter?" would be rendered: "You have pay that massa my chit?" In this the word *pay* conveys the act of transference, *massa* (corruption of *master*) the gentleman, and *chit* (from the Hindostanee) the letter. The dialect is never written, and has a very silly sound, resembling mere baby talk, chiefly from the frequent double *e* terminations; yet it is the vernacular vehicle of the commercial transactions of China with the outer world, and it is taught in a few Chinese schools as forming part of the curriculum necessary for the embryo merchant. In other eastern countries residents generally aim at acquiring enough of the native language to serve their wants, although in Japan the language thus used is as far from pure Japanese as is the grotesque pidjin English from pure English. The vocabulary of pidjin English is extremely limited, one word doing duty for a great variety of purposes: the word *pay*, above mentioned, is one of these; *walkee* is used for nearly all forms of motion; *sabe* for know, understand, &c.; *talkee* for say, talk, speak, tell, &c. A characteristic pidjin English sentence is that in which a Chinese merchant expressed what seemed to him the necessity of painting eyes on the bows of vessels (a thing always done in China); he said: "No got eye, no can see; no can see, no can sabe; no can sabe, no can walkee."

PIGEON HAWK, a small bird of prey of the falcon subfamily and genus *hypotriorchis* (Boie) or *æsalon* (Kaup), which differs from *falco* (Linn.) in its longer and more slender tarsi, covered in front with large hexagonal scales, and very long and slender toes. There are more than a dozen species scattered over the world, of which the two most common European representatives have been described under Hobby and Merlin; they prefer wooded cultivated districts, and usually follow in the train of the small migratory birds on which they prey; the flight is rapid and long sustained; the nest is made on trees or among rocks, and the eggs are from three to five. The American pigeon hawk, *H. columbarius* (Gray) or *F.* (*æsalon*) *lithofalco* (Gmel.), is 12 to 14 in. long and 26 in. in alar extent; the male is smaller than this. The adult bird has been described by Audubon as the little corporal hawk (*F. temerarius*); its general color is bluish slate, every feather with a longitudinal black line; forehead and throat white; below pale yellowish or reddish white, each feather with a longitudinal line of brownish black; the tibiæ are light ferruginous, with black lines; quills black, with ashy white tips; tail light bluish ash, tipped with white, with a wide subterminal black band and several narrower bands of the same; cere and legs yellow, and bill bluish; the younger birds are dusky or blackish brown above, and the tail has four to six white bands; the variations in plumage, according to age and locality, are considerable. It is found over all temperate North America, Central America, and the northern part of South America; it breeds in the north. It is the boldest hawk of its size, pouncing on thrushes, wild pigeons, woodpeckers, snipe, and even teals, but preying chiefly on birds of the size of the red-winged blackbird and sora rail; it has been known to attack cage birds in the porches of houses in crowded cities. According to Dr. Brewer, the eggs measure about 1⅔ by 1¼ in., and are nearly spherical; the color is not a very clear white, and there are a few bold irregular dashes of light yellowish brown, chiefly about the smaller end; the nest is coarsely constructed, resembling that of a crow.

American Pigeon Hawk (Hypotriorchis columbarius).

PIGMENTS, coloring matters mixed by painters with oil and other vehicles to form their paints. A variety of coloring matters can be used for pigments, differing greatly in durability or power to withstand chemical agents and the action of light and heat. As a rule pigments derived from the mineral kingdom are more durable than those which are organic. Pigments should be distinguished from the coloring matters used by the dyer and the calico printer; although several are employed in these arts, they are then dyes, and are only strictly to be considered pigments when used by the painter. The most important pigments are described in the article Paints.

PIGMY. See Pygmy.

PIGNEROL. See Pinerolo.

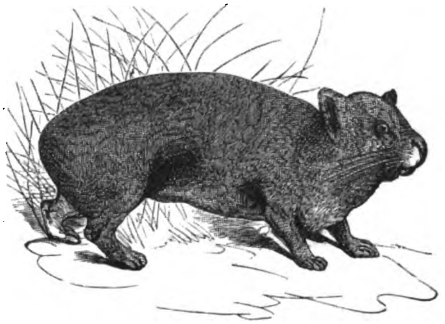
PIGNUT. See Hickory.

PIGWEED, the popular name in this country for several species of *chenopodium*, especially *C. album;* in England the same plants are called goosefoot, a more appropriate name, being a translation of the botanical name, which was given on account of the shape of the leaves (Gr. *χὴν*, a goose, and *ποῦς*, foot). In England the term pigweed (also sowbane) is confined to one species, *C. rubrum*, which was supposed to be fatal to swine. The chenopodiums or pigweeds are weedy-looking plants, sometimes covered with a mealy dust. They have alternate leaves and small, green, inconspicuous flowers, crowded in little spikes in the axils of the leaves, or forming spiked panicles; the flowers are apetalous, and consist of a usually five-cleft calyx, five stamens, two styles (rarely three), with a one-celled ovary, which in ripening becomes a thin one-seeded utricle; the embryo in the seed is coiled in a partial or complete ring around the mealy albumen. We have half a dozen species of *chenopodium* proper, all of which are probably introduced from Europe, though some are found in situations where they appear as if

Pigweed (Chenopodium album).

indigenous; usually they are met with in cultivated grounds and in the streets and waste places of towns. *C. album*, more generally known as pigweed than any other, is 1 to 3 ft. high, with leaves varying from rhombic-ovate to lanceolate, and more or less angled-toothed; the plant is usually covered with a white mealiness, though it is variable in this as in other characters. This is one of the many plants eaten by country people as "greens," and cooked when young is not a poor substitute for spinach; it is often called lamb's-quarters in this country, a name which in England is given to a plant of a different but related genus. Another species, *C. Bonus-Henricus*, was formerly cultivated in England for its large spinach-like leaves, and called good Henry or good King Harry and fat-hen. All of our pigweeds are annual, and while they indicate slovenly culture, they can hardly be regarded as troublesome weeds. The genus gives its name to a family, the *chenopodiaceæ*, which includes also the beet, mangel wurzel, and spinach, and among flowers the exceedingly fragrant *Boussingaultia*, or Madeira vine, the leaves of which are used in France as spinach.

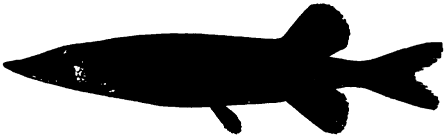
PIKA (*lagomys*, Cuv.), a genus of the family *leporidæ*, including the tailless hares. They have no visible tail, the ears are short and rounded, the hind legs short, and the molars $\frac{5-5}{5-5}$; the skull is very flat, dilated behind, the interorbital space contracted, the supraorbital processes absent, the orbits directed upward, and the malar bones extending backward nearly to the opening of the ear chamber; there is one principal opening in the nasal process of the superior maxillary bone; the zygomatic arch is remarkably short; the coronoid process of the lower jaw a mere tubercle, and the mental foramen situated near the middle of the ramus; the principal upper incisors have a deep vertical groove on the outer side, and terminate in two points with a notch at the end; the lower incisors simple; the upper molars as in the hares, the lower with a deep outer groove; there are generally small naked pads at the ends of the toes, the rest of the feet densely clothed with fur. The pikas are small, the largest not exceeding a Guinea pig; they are found only in alpine or subalpine districts, where they live in burrows or among loose stones, remaining quiet by day and feeding at night; the food consists of herbage of different kinds, which they store up in little piles in autumn; when feeding they often utter a chirping or whistling noise. The alpine pika (*L. alpinus*, Cuv.) is about 9½ in. long, with long and soft fur, grayish next the skin; general color above grayish brown, yellowish gray below; feet pale with a yellowish tinge; the ears margined with white; it inhabits Siberia from the river Irtish to Kamtchatka. Other species are found in the mountainous districts of Hindostan, some of them 6,000 or 8,000 ft. above the sea. The Rocky mountain pika (*L. princeps*, Rich.), or little chief hare, is about 7 in. long; the general color is grayish above, pencilled with black and yellowish white; yellowish brown on the sides, and dirty yellowish white below; it is found along the Rocky mountains from lat. 42° to 60° N.; it frequents heaps of loose stones, coming out after sunset. Three or four fossil species are described, from the osseous breccia and the pliocene of Europe.



Rocky Mountain Pika (Lagomys princeps).

PIKE (*esox*, Linn.), the common name of the soft-rayed abdominal fishes of the family *esocidæ*. Their headquarters are in North America, only one species being found in Europe and temperate Asia; they are confined to fresh water and to the northern hemisphere. The body is elongated and scaly; there is a single dorsal, generally opposite the anal, but no adipose fin; the upper jaw is formed principally by the intermaxillaries; the mouth is large and well furnished with teeth; there are several covered glandular accessory branchiæ, the number of branchiostegal rays varying from 3 to 18; swimming bladder simple; stomach siphonal, intestine short and without cæca; under the skin are vascular ramifications, peculiar to the family. According to Agassiz, the cylindrical elongated form indicates a low position among the abdominal fishes, as also does the mouth, the maxillaries being without teeth, while the palate bones are powerfully armed; the intermaxillaries and the maxillaries are in one arch, as in the salmon family; the skeleton, and especially the skull, is remarkably soft. The common pike of Europe (*E. lucius*, Linn.) rarely exceeds 3 ft. in length or a weight of 12 or 20 lbs.; some have been described considerably beyond these, but most are below them; the head is elongated and flattened, the lower jaw considerably the longer; the gape very large; the head and upper back dusky brown, becoming lighter and mottled with green and yellow on the sides, passing into silvery white below; pectorals and ventrals pale brown, other fins darker, mottled with white, yellow, and green; iris yellow. Young pikes, or pickerels, are of a greenish hue, and the colors vary much at all ages. The pike inhabits most of the rivers and lakes of Europe, and was long ago introduced into Great Britain, where it is now exceedingly common;

from the 13th to the 15th century it was so rare in England that the price was fixed by law, and was generally much higher than for salmon or turbot. The pike is very strong, active, and fierce; it darts from its reedy cover with extreme velocity, swallowing other fish, water rats, and even small aquatic birds; Lacépède calls it the shark of the fresh waters; it spares not its own species, and devours its young and even the remains of decomposing carcasses. Wonderful stories have been told regarding the gigantic size and extreme longevity of the pike, and we can readily conceive that it may attain a weight of 40 or 50 lbs. and an age of 100 years, where food is abundant and anglers absent. Its flesh is well flavored and easy of digestion. Cuvier, Richardson, and others have asserted that this species occurs also in the great American lakes; but on the general principle that the animals of America and Europe, with the exception of the arctic fauna, though nearly allied, have not been found identical species, this may be reasonably doubted; the fish described from America as *E. lucius* is probably the first of the species noticed below, or else one of the many as yet undescribed.—The common lake pike of America (*E. estor*, Lesueur) attains a length of 3 ft.; the back is deep greenish brown, the sides with numerous rounded and oblong pale yellowish spots, and the abdomen white; the fins are reddish yellow, marbled with blackish and deep green, the caudal large and lunated; it is found in the great northern lakes. The muscalonge or maskinonge (*E. nobilior*, Thompson) of Lake Champlain is larger and rarer, and much better for the table, always commanding a higher price than the lake pickerel, though the latter is often erroneously called muscalonge; the lower half of the cheek is without scales, which is not the case in *E. estor*. Mr. Thompson (in his appendix to the "History of Vermont," 1853) spells the name *masquallonge*, deriving it from *masque* (face) and *allongé* (elongated), an epithet given to it and other pikes by the French Canadians. This may be distinguished from the lake pickerel by the nearly black color of the back, the bluish gray sides with dark brown rounded markings, its grayish white abdomen tinged with ruddy, its more robust proportions, shorter head, flatter face, and wider jaws; it attains a length of more than 4 ft., and a weight of 40 lbs. Agassiz describes a large pike from Lake Superior, in his narrative, under the name of *E. boreus*. The common pike of the northern states, the long or shovel-nosed pickerel (*E. reticulatus*, Lesueur), attains a length of 1 to 2 ft.; the colors vary in different localities, but in most the body is green above and golden yellow on the sides, with irregular dark longitudinal lines united into imperfect reticulations; lower parts white, flesh-colored on the throat; a black vertical band beneath the eye; dorsal and caudal fins greenish black, the others flesh-colored. This is everywhere valued for the table, and is caught at all seasons, even through the ice; it is taken generally with a hook, baited with a frog's leg, small fish, or any white substance moved rapidly over the surface of the water; it is also speared through holes in the ice, or from boats to which it is attracted by bright lights. It is a very rapid swimmer, voracious, and strong; like other species it remains apparently motionless in the water watching an opportunity to dart upon its prey, which consists of any fish which it can possibly swallow, the spiny perch in most cases excepted; while the body remains suspended, there is an incessant motion of the last few rays of the dorsal and anal fins, especially the former, with a rotary movement of the pectorals, and occasionally of the ventrals and caudal; these forces maintain such an exact equilibrium that the fish does not move in the water. The trout pickerel, or short-nosed pickerel (*E. fasciatus*, De Kay), is commonly somewhat smaller; the general color is dark greenish, with about 20 narrow blackish brown bands, not forming a network; the throat stained with fuliginous; the body is proportionately stouter and the snout shorter than in the preceding species. This species is found generally in the pickerel weed or in water bushes (*cephalanthus occidentalis*); it is taken at all seasons, but rarely in the deep-water channel like the long-nosed species; it takes the bait eagerly, and makes back into the shallow coverts whence it darted; it bites at any time of day, and whether the bait be at or beneath the surface, moving slow or fast; it is more voracious, if possible, than the *E. reticulatus*, an individual being frequently landed after having been several times drawn partly out of water; it has been known to take the hook with the tail of a half digested fish visible in its mouth. Any one who has seen pickerel dart upon fish in an aquarium, and witnessed the force with which they strike the bottom, will perceive what an admirable fender the prominent lower jaw makes; it is frequently much lacerated by violent contact with the bottom, without the upper jaw suffering at all.—The name of pike is sometimes given to the long-jawed marine fish of the allied genus *belone* (Cuv.); in this the head and body are very much elongated, the latter covered with very minute scales; the long jaws are straight, narrow, pointed, and armed with numerous small teeth. The *B. truncata* (Lesueur), called the long-jawed or gar pike, is from 1 to 2 ft. long, of a light greenish color above and silvery beneath, with a dark band extending from above the pectorals to the origin of the dorsal; the body is slender, and the



Common Pike (Esox reticulatus).

head flattened; the dorsal is on the posterior fourth of the body, highest in front and rapidly decreasing toward the caudal; the anal shaped like the dorsal, and opposite to it. It is found in the southern New England and the middle states. The European sea pike (*B. vulgaris*, Cuv.), or mackerel guide, so called from its preceding the latter to shallow water to spawn, is about 2 ft. long; it is abundant on the coasts of northern Europe, and is eaten in the spring; it is also used as bait. It is active, swims near the surface, and often springs out of water. The color above is dark greenish blue, and silvery below; dorsal and caudal greenish brown, and other fins white.

Gar Pike (Belone truncata).

PIKE, the name of counties in ten of the United States. **I.** A N. E. county of Pennsylvania, separated from New York and New Jersey, which there form an angle, by the Delaware river, and drained by Lackawaxen and Shohola creeks; area, about 600 sq. m.; pop. in 1870, 8,436. It has a rough, hilly surface and indifferent soil, with forests that yield large quantities of timber. The N. part is traversed by the Delaware and Hudson canal, and the Erie railway and Honesdale branch. The chief productions in 1870 were 6,064 bushels of wheat, 22,369 of rye, 56,815 of Indian corn, 28,654 of oats, 29,522 of buckwheat, 71,910 of potatoes, 8,974 tons of hay, and 161,179 lbs. of butter. There were 832 horses, 2,142 milch cows, 2,066 other cattle, 1,237 sheep, and 1,560 swine; 1 manufactory of jewelry, 5 tanneries, 2 currying establishments, 1 flour mill, and 11 saw mills. Capital, Milford. **II.** A W. county of Georgia, bordered W. by Flint river and drained by Big Potato, Elkins, and other creeks; area, about 400 sq. m.; pop. in 1870, 10,905, of whom 4,906 were colored. It has an uneven surface and moderately fertile soil. It is intersected by the Macon and Western railroad. The chief productions in 1870 were 30,135 bushels of wheat, 182,045 of Indian corn, 18,368 of oats, 24,745 of sweet potatoes, 51,116 lbs. of butter, and 5,676 bales of cotton. There were 701 horses, 1,113 mules and asses, 1,652 milch cows, 3,240 other cattle, 1,817 sheep, and 6,253 swine. Capital, Zebulon. **III.** A S. E. county of Alabama, bordered E. by Pea river and drained by the Conecuh river and its branches; area, about 700 sq. m.; pop. in 1870, 17,413, of whom 4,625 were colored. Its surface is undulating, much of it covered with pine; the soil is not very fertile. The Mobile and Girard railroad terminates at the county seat. The chief productions in 1870 were 309,965 bushels of wheat, 64,451 of sweet potatoes, and 7,192 bales of cotton. There were 1,615 horses, 1,323 mules and asses, 3,521 milch cows, 1,379 working oxen, 6,314 other cattle, 2,878 sheep, and 24,438 swine. Capital, Troy. **IV.** A S. county of Mississippi, bordering on Louisiana and drained by Bogue Chitto river and its branches; area, about 850 sq. m.; pop. in 1870, 11,303, of whom 5,312 were colored. It is intersected by the New Orleans, Jackson, and Great Northern railroad. The chief productions in 1870 were 151,891 bushels of Indian corn, 28,546 of sweet potatoes, 10,662 of peas and beans, and 4,133 bales of cotton. There were 1,162 horses, 1,777 milch cows, 4,454 other cattle, 4,145 sheep, and 7,560 swine. Capital, Holmesville. **V.** A S. W. county of Arkansas, drained by the Little Missouri river and its branches; area, about 600 sq. m.; pop. in 1870, 3,788, of whom 421 were colored. It has a hilly surface and fertile soil. The chief productions in 1870 were 122,358 bushels of Indian corn, 10,842 of sweet potatoes, and 1,109 bales of cotton. There were 798 horses, 1,390 milch cows, 2,303 other cattle, 2,068 sheep, and 9,861 swine. Capital, Murfreesborough. **VI.** A county of Kentucky, in the extreme E. corner of the state, bordering on Virginia and West Virginia, drained by the W. fork of Big Sandy river; area, 400 sq. m.; pop. in 1870, 9,562, of whom 102 were colored. It has a hilly surface, the Cumberland mountains extending along the S. E. border and a spur partly along the S. W. There are extensive beds of bituminous coal. The chief productions in 1870 were 13,401 bushels of wheat, 332,802 of Indian corn, 25,035 of oats, 23,244 of Irish potatoes, 14,607 of sweet potatoes, 81,966 lbs. of butter, 16,811 of wool, and 17,157 of tobacco. There were 1,445 horses, 3,087 milch cows, 1,943 working oxen, 3,185 other cattle, 7,670 sheep, and 15,509 swine. Capital, Piketon. **VII.** A S. county of Ohio, intersected by the Scioto river and drained by several branches; area, about 425 sq. m.; pop. in 1870, 15,447. It has a diversified surface and fertile soil. It is intersected by the Ohio canal. The chief productions in 1870 were 62,815 bushels of wheat, 740,557 of Indian corn, 108,178 of oats, 59,129 of potatoes, 6,446 tons of hay, 20,105 lbs. of tobacco, 36,852 of wool, 215,681 of butter, and 35,836 gallons of sorghum molasses. There were 4,174 horses, 3,080 milch cows, 6,088 other cattle, 14,261 sheep, and 18,102 swine; 5 flour mills, 15 tanneries, 11 saw mills, and 1 woollen mill. Capital, Waverley. **VIII.** A S. W. county of Indiana, bordered N. by White river and drained by Patoka and S. Patoka creeks; area, 337 sq. m.; pop. in 1870, 13,779. It has a gently undulating surface and a generally fertile soil. It is intersected by the Wabash and Erie canal. The chief productions in 1870 were 167,262 bushels of wheat, 566,709 of Indian corn, 53,084 of oats, 21,624 of potatoes, 121,671 lbs. of butter, 40,112 of wool, 1,119,856 of tobacco, and 4,067 tons of hay. There were 4,311 horses, 3,041 milch cows, 5,101 other cattle, 17,-

381 sheep, and 26,413 swine. Capital, Petersburgh. **IX.** A W. county of Illinois, separated from Missouri on the southwest by the Mississippi river, bounded E. by the Illinois, and drained by McKee's, Bay, and Little Muddy creeks; area, about 750 sq. m.; pop. in 1870, 30,768. A lateral channel of the Mississippi, called Snycartee slough, traverses the county. It has a rolling surface, about equally divided between forest and prairie, and the soil is very fertile. It contains large quantities of coal. The Hannibal division and the Pittsfield branch of the Toledo, Wabash, and Western railroad pass through it. The chief productions in 1870 were 1,057,627 bushels of wheat, 1,399,188 of Indian corn, 161,419 of oats, 54,736 of potatoes, 385,672 lbs. of butter, 71,638 of wool, and 17,216 tons of hay. There were 11,047 horses, 1,880 mules and asses, 7,657 milch cows, 12,315 other cattle, 18,688 sheep, and 51,433 swine; 18 manufactories of carriages and wagons, 15 of cooperage, 9 of saddlery and harness, 5 of tobacco, 3 of woollen goods, 14 flour mills, and 6 saw mills. Capital, Pittsfield. **X.** An E. county of Missouri, separated from Illinois by the Mississippi river, intersected by Salt river, and drained by several creeks; area, about 700 sq. m.; pop. in 1870, 23,076, of whom 4,195 were colored. It is intersected by the Chicago and Alton railroad. The chief productions in 1870 were 438,009 bushels of wheat, 699,522 of Indian corn, 232,828 of oats, 28,357 of potatoes, 12,489 tons of hay, 632,552 lbs. of tobacco, 69,791 of wool, 253,545 of butter, 31,015 of honey, and 11,418 gallons of sorghum molasses. There were 8,091 horses, 3,079 mules and asses, 5,760 milch cows, 11,224 other cattle, 22,608 sheep, and 30,062 swine; 12 manufactories of carriages and wagons, 3 of tobacco, 3 of woollen goods, 1 distillery, 1 iron foundery, 6 flour mills, 7 saw mills, and 3 planing mills. Capital, Bowling Green.

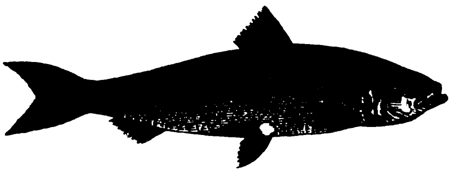
PIKE, Albert, an American poet, born in Boston, Dec. 29, 1809. When he was four years old the family removed to Newburyport. At the age of 16 he entered Harvard college; but being unable to support himself in Cambridge, he became a teacher. In the spring of 1831 he started for the west and south. From St. Louis he set out with a company of 40 on an expedition to Mexico, and remained a year at Santa Fé. In September, 1832, he left Taos with a company of trappers, and, after a visit to the head waters of the Red and Brazos rivers, separated with four others from the party, and travelled 500 miles on foot to Fort Smith in Arkansas. The following winter he spent in teaching. In the mean time he had written poems for the "Arkansas Advocate," published at Little Rock, of which he became part proprietor, and in 1834 bought the whole establishment. He edited the paper till 1836, but meanwhile studied law and was admitted to the bar, after which he devoted himself entirely to that profession. In 1836 he supervised the publication of the revised statutes of Arkansas. During the Mexican war he served with distinction as a volunteer. On the outbreak of the civil war he organized a body of Cherokee Indians, and fought with them on the confederate side in the battle of Pea Ridge. In 1867-'8 he edited the "Memphis Appeal." He has published "Hymns to the Gods" (Boston, 1831), republished in "Blackwood's Magazine" in 1839; "Prose Sketches and Poems" (Boston, 1834); "Reports of Cases in the Supreme Court of Arkansas" (5 vols., Little Rock, 1840-'45); "The Arkansas Form Book" (8vo, 1845); and "Nugæ" (Philadelphia, 1854, printed only for private distribution). He has held the highest offices in the society of freemasons, and has published "Statutes and Laws of the Ancient Scottish Rite" (1859).

PIKE, Zebulon Montgomery, an American soldier, born in Lamberton, N. J., Jan. 5, 1779, killed in the attack on York (now Toronto), Canada, April 27, 1813. He entered the army, serving in his father's company, and rose to the rank of lieutenant. After the United States purchased Louisiana, Pike was sent to explore the sources of the Mississippi and the surrounding territory. He left St. Louis Aug. 9, 1805, at the head of 20 men, provisioned for four months; but his journey lasted nearly nine months, during which he suffered greatly. Soon after his return he was sent on a similar expedition to the interior of Louisiana. Here winter overtook the party, and for weeks they suffered from cold and hunger. After three months' march they made their way to what they supposed was the Red river, but were taken prisoners by a body of Spanish cavalry, who informed them that they were in Spanish territory and on the banks of the Rio Grande. After an examination before the commandant general of the province of Biscay, Pike was sent home, arriving at Natchitoches July 1, 1807. He received the thanks of government, and was made successively captain, major, and in 1810 colonel of infantry. In that year he published an account of his two expeditions. At the beginning of the war of 1812 he was stationed on the northern frontier, was appointed in 1813 brigadier general, and was selected to command the land forces in the expedition against York, the capital of Upper Canada. He sailed from Sackett's Harbor April 25, arrived at York April 27 at the head of 1,700 men, and after landing and carrying one battery he was mortally wounded from the explosion of the British magazine.—See his life by H. Whiting in Sparks's "American Biography," second series, vol. v.

PIKE'S PEAK, a summit of the Rocky mountains, in El Paso co., Colorado, about 75 m. S. of Denver; elevation more than 14,000 ft. above the sea. It is reached from Colorado Springs on the Denver and Rio Grande railroad. The distance to the summit from this point is 19¼ m.: the whole can be travelled on horseback. Two enormous gorges extend from the top almost to the base, one of them visible to the naked eye at the distance of 80 m. The summit is nearly level, embracing about 40 acres, and composed of angular slabs and blocks of coarse, disintegrating granite. It affords one of the grandest views on the North American continent, extending nearly 150 m. in all directions. In the higher parts of the gorges snow is perpetual. Pike's peak is named in honor of Gen. Zebulon M. Pike, who discovered it in 1806. The discovery of gold near its base having been reported in 1858, Pike's Peak became for a time the popular name of the Rocky mountain gold region within the present limits of Colorado, though remunerative diggings were not developed within many miles of the mountain.

PILATE, Pontius, the Roman officer or ruler of Judea under whom Christ suffered. The nature of his office is not well understood. In the Greek Testament he is called ἡγεμών, which King James's and the Rhemish versions translate "governor;" Philo Judæus and the Greek fathers style him ἐπίτροπος, Josephus both ἐπίτροπος and ἡγεμών, and Tacitus *procurator*. He was the sixth Roman incumbent of that office, succeeding Valerius Gratus, A. D. 25 or 26, under the reign of Tiberius, and retaining the post ten years. He moved his military headquarters and the standards bearing the image of the emperor to Jerusalem, but was forced by the rage of the people to send the standards back to Cæsarea. Jesus was brought to him for punishment, having been condemned by the Jews for blasphemy; but as he would not notice a merely religious offence, they made a new charge of sedition. Pilate became satisfied that this charge was unjust, but fearing to irritate the Jews, who already had grounds of complaint against him, he tried to shift the responsibility upon Herod Antipas, tetrarch of Galilee, and afterward to induce the people to forego their purpose; and finally, washing his hands in token of his innocence of the wrong, he reluctantly ordered the crucifixion. Josephus relates several acts of injustice committed by him, and he was finally disgraced in consequence of his cruelty to the Samaritans, a number of whom he caused to be massacred for a slight disturbance excited by his oppressions. The Samaritans complained to Vitellius, the proconsul of Syria, who ordered Pilate to go to Rome to answer the accusation. Tiberius was dead before his arrival, but according to Eusebius the disgraced procurator was banished to Vienne in Gaul, where he committed suicide about A. D. 38. According to a legend, he spent his last years in the recesses of the mountain by Lake Lucerne now called Mt. Pilatus, and drowned himself in the lake on its summit, where a spectral form is sometimes seen emerging from the waters and going through the motion of washing its hands. It can hardly be doubted, after the testimony of several ancient writers, that Pilate transmitted to the emperor Tiberius a report of Christ's trial and condemnation; but the extant "Acts" and "Letters" under his name are universally regarded as spurious.—See Lipsius, *Die Pilatusacten* (Kiel, 1871).

PILCHARD, a fish of the herring family, and genus *alosa* (Cuv.). It is about as large as a herring, but rounder and thicker, and with larger scales; it differs principally from the herring (*clupea*) in having a deep notch in the centre of the upper jaw. It is the *A. pilchardus* (Val.), from 9 to 11 in. long, bluish green above, on the sides and below silvery, the dorsal fin and tail dusky, the cheeks and gill covers tinged with golden yellow and with variously radiating striæ; the mouth small and without teeth. It feeds on shrimps, minute crustaceans, and the roe of fish. It occurs in immense numbers on the coasts of Cornwall and Devonshire, from July until Christmas; it is caught, principally at night, in large perpendicular nets, one end of which is sunk to the bottom by weights and the other kept afloat by corks; as many as 1,200 hogsheads have been taken in a single fishing, and the average annual product in Cornwall is over 20,000 hogsheads, containing about 60,000,000 individuals; the fish are preserved in the same way as herring. This species is abundant on the coasts of Brittany, Spain, and Portugal.



Pilchard (Alosa pilchardus).

PILCOMAYO, a river of South America, formed by the united waters of the Cachimayo and Pilaya, which rise in the E. slope of the Bolivian Andes, the first just S. of Chuquisaca, and the other in the extreme S. W. corner of Potosí, and unite about lat. 20° 30′ S., lon. 63° W. Thence the river, widening considerably, flows generally S. E. about 800 m. through the Chiquitos country, and across the Gran Chaco, to its confluence with the Paraguay nearly opposite Asuncion, into which it flows by three mouths, the two outer ones 24 m. apart. The country drained by this river is mainly covered with rich forests; but it is too shallow for navigation even by flat-bottomed steamers, the average depth not being over 4 ft.

PILES. See HÆMORRHOIDS.

PILGRIMAGE (Lat. *peregrinatio;* Ital. *pellegrinaggio*), a journey undertaken from devout motives to some holy place. The history of Christian pilgrimages belongs chiefly to the middle ages, though from the earliest times the faithful resorted to Palestine. This practice was adopted from motives of personal devotion, and not unfrequently was imposed as an atonement for public sins. Eusebius, St. Basil the Great, St. Gregory of Nyssa, Jerome, and others, attest the frequency of these pilgrimages and mention the great number of pilgrims. The dedication of the church of the Resurrection at Jerusalem, built by Constantine, attracted an immense concourse from east and west. The empress Helena also went thither as a pilgrim, and built many churches. The subsequent increase of this devotion remained unchecked till Palestine and Jerusalem passed into the possession of the Mohammedans. Still the hardships which this conquest threw in the way of pilgrims served rather to stimulate their fervor. Their departure from western Christendom was attended with peculiar religious solemnities. Each pilgrim on setting out received from the priest a scrip and staff, together with a coarse woollen gown marked with a cross; a blessing was pronounced on him, and he was accompanied by a procession as far as the next parish. He carried neither money nor arms, but had to show a passport from his sovereign and a letter of communion from his bishop. He was received by all Christians with ready kindness; for next in merit to being one's self a pilgrim was accounted the providing for the safety and comfort of the wayfarers. Hospitals and monasteries were built for their reception along the most frequented routes and in the city of Jerusalem, and Christians residing there exposed themselves to great dangers in order to go and meet them on the road. Female pilgrims were received by religious communities of their own sex. The merchants of Amalfi, Venice, and Genoa, and the princes of the West, bore most of the expense of supporting these hospitals, and every year monks of Palestine came to Europe to collect alms for the same purpose. When the pilgrim arrived at the holy city he prepared himself by fasting and prayer, and then visited the sepulchre covered with a robe which he afterward preserved to be buried in. He viewed Mount Zion, the mount of Olives, the valley of Jehoshaphat, Bethlehem, Mount Tabor, and the other principal places associated with the miracles of Christ; and having bathed in the Jordan, he gathered in the territory of Jericho a palm branch, which on his return home he presented to his priest to be laid upon the altar in token of the completion of his enterprise. From this circumstance the pilgrims to Palestine were called palmers. The Mohammedan caliphs treated the pilgrims alternately with cruelty and kindness; but under the Seljuk Turks, who conquered Palestine about 1076, they were subjected to violent persecution. About this time the archbishop of Mentz, with the bishops of Bamberg, Utrecht, and Ratisbon, undertook a pilgrimage to the Holy Land, and the multitude of their followers amounted to 7,000 persons, of whom fewer than 2,000 reached home again in safety. A few years later the miseries of the pilgrims and Christian inhabitants of Jerusalem gave rise to the crusades, which may be considered as armed pilgrimages on a large scale. (See CRUSADES.) Besides relics of saints and precious remains of Christian antiquity, the pilgrims brought back the industrial and artistic products of the East; French and Italian merchants established warehouses in Jerusalem, and every year on Sept. 15 a fair was opened on Mount Calvary, where the Franks and Moslems exchanged their goods. In the present century a society was organized in France for promoting yearly pilgrimages to Palestine. Some pilgrims travelled as far as Egypt, and penetrated to the solitudes of Memphis and the Thebaid, inhabited by the disciples of St. Anthony and of St. Paul of Thebes, the first hermit.—The tombs of St. Peter and St. Paul at Rome were reckoned only less sacred than Palestine, and Loreto on the E. coast of Italy was famous for the Virgin Mary's house (see LORETO), as well as Assisi for the tomb of St. Francis. But the greatest crowds of pilgrims were drawn to Rome by the devotions of the jubilee, which at first was celebrated the last year of each century, was held with increased solemnity by Boniface VIII. in 1300, was fixed for every 50th year by Clement VI., for every 33d year by Urban VI., and for every 25th year by Paul II. As the indulgences granted for the jubilee can, by permission of the pope, be gained by Roman Catholics at home on certain conditions, the influx of pilgrims to Rome on such occasions has been diminished. In Germany, the church of St. Peter and St. Paul at Treves boasted from 1190 the possession of the seamless robe worn by Christ. During the middle ages pilgrims flocked thither from every country in Europe; and this devotion, which had almost died out since the reformation, revived in 1810, and grew to such a degree that in 1844 1,100,000 pilgrims visited the city. Cologne, with the supposed tomb of the three kings, and the shrine of St. Ursula and her companions, was next in popularity. Next came Oetting, Celle, and Einsiedeln in Switzerland. The tomb of St. John Nepomuk in Prague was a devotional centre for Bohemia. In Spain the most famous shrines were those of St. James the Apostle at Compostela and of the Virgin Mary at Monserrat. The former ranked with the pilgrimage to Rome, and almost rivalled that of Jerusalem. After the 16th century Loyola in Guipúzcoa, the native place of St. Ignatius, became a favorite resort of numerous pilgrims from the Iberian peninsula, France, and Italy, among whom were many crowned heads. France counted many famous shrines from an early date. The most celebrated were: Mont St. Michel on the coast of Normandy, St. Martin at Tours, St. Anne d'Auray in Brittany, the churches of Ste. Geneviève and St. Denis in and near Paris, La Vierge Noire at Chartres, the churches of Notre Dame at Liesse near Laon and at Fourvières near Lyons, and that of Notre Dame de la Garde at Marseilles. In our own times Paray-le-Monial, Lourdes, and La Salette have acquired a sudden and remarkable celebrity. (See Paray-le-Monial.) Lourdes, a little town in the department of Hautes-Pyrénées, has become famous since 1858 for the reported apparition of the Virgin Mary to Bernardette Soubirous, and La Salette, in Haute-Loire, for a similar apparition to two shepherd children. A monumental church has been erected at Lourdes, and the waters of an adjoining spring, reputed as possessing miraculous healing powers, are drunk by the pilgrims and sent to every part of the world. Pontigny also, where St. Thomas à Becket lived in exile among the Cistercian monks, and which contains the shrine of his exiled successor St. Edmund Rich, archbishop of Canterbury, was in the middle ages resorted to by many French and English pilgrims; and on Sept. 2, 1874, 500 English pilgrims, headed by Archbishop Manning and Lord Edmund Howard, went thither to invoke the intercession of St. Edmund in favor of the church in Italy and Germany. In May, 1874, American pilgrims to the number of 120 left New York for Paray-le-Monial and Rome. England numbered many celebrated shrines of the Virgin Mary, the most ancient of which was Glastonbury, and the most renowned Walsingham. The shrine of St. Cuthbert at Durham, and still more that of St. Thomas à Becket at Canterbury, were frequented by numerous pilgrims before the reformation. St. Winifred's chapel at Holywell, in northern Wales, has been a favorite place of pilgrimage since the 12th century. Iona, off the west coast of Scotland, was long famed as a place of pilgrimage. In Ireland there were a great number of such places, the principal being the shrine of St. Patrick at Downpatrick, St. Patrick's Purgatory, an island in Lough Derg, and Croagh Patrick, overlooking Clew bay in Mayo. In America the most noted places of pilgrimage are Guadalupe near the city of Mexico and St. Anne near Quebec, which is yearly frequented by crowds from every part of Canada.—The Russian Orthodox church has also fostered the zeal for pilgrimages. Besides Jerusalem and the monastery of Mt. Athos, there are famous shrines at Kiev, the *lavra* (high monastery) of the Holy Trinity about 30 m. from Moscow, and St. Alexander Nevskoi near St. Petersburg.—Among the Mohammedans the pilgrimage most in repute is that to Mecca. (See Hadji.) The favorite shrines for the Persians are Mesjid Ali, the burial place of the caliph Ali, and Kerbela, where Hussein, son of Ali by Mohammed's daughter Fatima, was slain. The Persians also make visits to Mecca and Medina. In Hindostan there are innumerable holy places to which devotees resort, the most celebrated of which are Juggernaut, Benares, Hurdwar, Dwarka, and Nassick. The pilgrimages are generally at festivals lasting several days, a part of the time being passed in religious rites, a part in amusements, and a part in business. Thieving, lewdness, and all forms of villany are then especially rife. Some of the pilgrims lose all their means and have to beg their way home; others resort to such places for the purpose of ending their existence, for it is believed that those who die at certain of these holy spots are exempt from future suffering and metempsychosis. Many of the devotees in proceeding on a pilgrimage prostrate themselves on the ground at every step, repeating each time the name of the god or the place to which they are going. The Mongols have a strong taste for pilgrimages, and their country abounds with places of reputed great sanctity, generally Buddhist monasteries, to which at certain times vast crowds are attracted. A rite greatly in vogue at such times consists in making the circuit of the monastery in a series of prostrations, the body being extended at full length and the forehead touching the ground at every step. As the monasteries with their outbuildings are often very large, it is frequently difficult to accomplish the feat in a single day. The Japanese of the Shinto sect make pilgrimages to a famous temple in the province of Isje, which every one is obliged to visit at least once in his life. The journey is made generally in the spring and on foot. Other devotees, usually in companies of two or three, travel about the empire to visit the chief temples. They are dressed in white after a peculiar fashion, and obtain their bread by singing from house to house, many of them having no other occupation, but passing their lives in perpetual pilgrimage. In the coldest weather pilgrims journey to certain temples with no covering but a little straw about their waists. They receive no charity, live poorly, and run nearly all the distance. The Sinai of the Japanese Buddhists is the volcano of Fusiyama near Tokio (Yedo), and a yearly pilgrimage to it is the duty of every one.

PILLARS OF HERCULES. See Gibraltar.

PILLAU, a seaport of Prussia, in the province of Prussia, 26 W. by S. of Königsberg, on the Baltic, at the entrance of the Frisches Haff, and on a tongue of land called the Paradise on account of its fine situation; pop. in 1871, 2,909, exclusive of the garrison. It is the port of Königsberg for large vessels, a third class fortress, a favorite watering place, and one of the most important Prussian seaports. It has a school of navigation, and captains and pilots are examined by committees sitting at Pillau. The shipping business has more than doubled within the last generation. The present town was founded in 1722, but Old Pillau, a village 1 m. N. E. of it, is much older, as is also the fortress.

PILLNITZ, or **Pilnitz**, a village of Saxony, on the right bank of the Elbe, 7 m. S. E. of Dresden; pop. about 600. The royal family reside here during the summer months. In its palace the emperor Leopold II. and Frederick William II. of Prussia met in August, 1791, and concerted the preliminaries of a coalition to oppose the progress of the French revolution, and enforce the regal rights of Louis XVI.

PILLORY, an instrument of punishment, consisting of a wooden frame erected on posts, having holes in it through which the head and arms of the culprit were thrust, in which position he remained for a certain time prescribed by his sentence exposed to the view of the public. It existed in France, where it was anciently called *pillorie*, and in more modern times *carcan*, from the iron collar used to fasten the neck of a criminal to a post; in Germany, where it was called *Pranger;* and in England even before the Norman conquest, where it was called *healfange*, or more correctly *halsfang* (catch-neck). By the "statutes of the pillory" passed in the reign of Henry III., the punishment was employed for such crimes as forestalling, using deceitful weights, perjury, and forgery. According to the form of the judgment, the criminal was to be set in or upon the pillory. Being pilloried was a real punishment or not, according to the number of the criminal's personal friends or enemies. The former sometimes rallied in force, fed him, sheltered him from the weather, and turned the affair into a triumph; the latter often pelted him with rotten eggs and stones, and sometimes he lost his life. The use of the pillory was abolished in England in all cases except perjury in 1816, and altogether in 1837. In like manner, when the penal code of France was revised in 1832, the *carcan* was abolished. The punishment of the pillory was provided for some offences against the United States by early statutes, but was abolished in 1839.

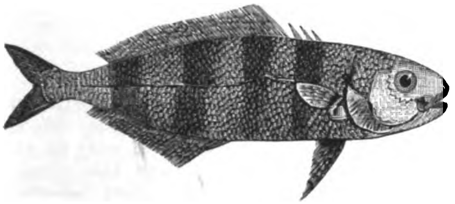
Pillory, from an old Engraving.

PILLOW, Gideon Johnson, an American soldier, born in Williamson co., Tenn., June 8, 1806. He graduated at Nashville university in 1827, studied law, and commenced practice at Columbia, Tenn. In 1844 he was a delegate to the democratic national convention at Baltimore, where he aided largely in gaining the presidential nomination for Mr. Polk. When the war with Mexico broke out in 1846, he was made a brigadier general of volunteers, and after serving under Gen. Taylor was ordered to join Scott at Vera Cruz, and took part in the siege of that city. At the battle of Cerro Gordo, April 18, 1847, he commanded the right wing, was wounded, and was soon after made major general. In June, at the head of a considerable force, he moved inland, joined Gen. Scott, and took part in the battles of Churubusco, Chapultepec, and Molino del Rey. After the close of the war he was arrested upon charges of insubordination preferred by Gen. Scott, was tried by court martial, and acquitted. He then resumed the practice of his profession. At the opening of the civil war he entered the confederate service, commanded at the battle of Belmont, Mo., Nov. 7, 1861, and was second in command under Gen. Floyd at Fort Donelson in February, 1862. Floyd, refusing to perform the act of surrender, handed over the command to Pillow, who made it over to Buckner, who surrendered the fort, Floyd and Pillow escaping with a portion of their men. He was relieved from command, but subsequently served under Beauregard in the southwest.

PILNITZ. See Pillnitz.

PILOT. In some maritime countries of Europe this word was formerly, and is to some extent even now, used to designate an officer of a vessel having the charge of the ship's course. By general usage the term is now applied to a person not belonging to a ship, who conducts it into or out of a harbor, or over shoals, or wherever the navigation requires superior local knowledge. The office is regulated by law in most civilized countries. The English statutory provisions on this subject are to be found in the merchants' shipping act, 1854, 17 and 18 Victoria, c. 104, §§ 330–388. In the United States an act of congress authorizes the several states to make their own pilotage laws; and such laws have been accordingly enacted by all the seaboard states. These laws generally provide for the appointment of commissioners who are invested with power to make all needful rules and regulations on the subject. While a pilot is on board a vessel within the pilot grounds, he has the control of it, and is answerable for any injury which may happen to it through his fault; and this liability was carried to such an extent by the early maritime law of some European countries, that the pilot, if unable to render full satisfaction, atoned for his negligence with his life. While the pilot is on board the power of the master of the vessel is not wholly superseded. It is his duty, in case of obvious and certain disability, or dangerous ignorance or mistake on the part of the pilot, to dispossess him of his authority. So it is the duty of the master to see that a lookout is kept; and generally, while the orders of the pilot are imperative as to the course the vessel is to pursue, the management of it is still under the control of the master. The pilot is the servant of the owner of the vessel, and the latter is generally liable to third persons for any damage resulting from his negligence or fault. But if, as when a vessel is entering a port, the master is obliged to take the first pilot that offers, or pay a certain amount, it would seem that such taking is by compulsion, and that the owner should not be liable for his acts. This is the settled law in England, but it is perhaps still an open question in the United States.

PILOT FISH, a scomberoid fish of the genus *naucrates* (Raf.). It is characterized by a fusiform body, small uniform scales, a keel on the side of the tail, the dorsal composed of isolated spines, and the ventrals under the pectorals; the head is compressed, the teeth thin and crowded on the jaws and palate, and the branchiostegal rays seven; some free spines in front of the dorsal and anal fins. There are four species, of which the best known is the *N. ductor* (Raf.), the famous pilot fish of navigators; it is about a foot long, shaped like a mackerel, of a silvery gray color, bluish on the back, with five dark blue bands encircling the body. This species attends vessels for long distances, for the sake of the bits of food thrown overboard; this may account for its strange fellowship with the sharks; they seem to be on good terms with each other, but probably have a common object in view, the obtaining of food, the smaller being too nimble for the greater. It inhabits the Mediterranean and the Atlantic, following vessels into the tropics and even to the coasts of America; its flesh is said to be very good. It was held sacred by the ancients, from the belief that it led vessels in their proper course and through dangerous passages. On the American coast is described the *N. Noveboracensis* (Cuv.), with four transverse bands and four spines before the dorsal.



Pilot Fish (Naucrates ductor).

PILOT KNOB. See IRON MOUNTAIN.

PILOT MOUNTAIN. See ARARAT.

PILOTY, Karl Theodor von, a German painter, born in Munich, Oct. 1, 1826. He studied in Munich, Paris, Brussels, Rome, and London, became known by his "Establishment of the Catholic League" (1853), "Seni and the Remains of Wallenstein" (1855), "Wallenstein's Assassination" (1858), and "Nero among the Ruins of Rome" (1861). Among his later works are "The Death of Cæsar," "The Triumphal March of Germanicus," "Henry VIII. sentencing Anne Boleyn to Death," and his fresco representing a German legendary hero (1875). He has been professor at the academy for about 20 years, and on the death of Kaulbach in 1874 he succeeded him as president.—His younger brother FERDINAND, a genre and historical painter, has executed frescoes for the Bavarian national museum at Munich.

PILPAY. See BIDPAY.

PILS, Isidore Alexandre Augustin, a French painter, born in Paris, July 19, 1813. He studied under Picot and at the school of fine arts, and in 1838 won the great prize of Rome. His productions comprise "St. Peter healing the Lame at the Gate of the Temple," "Christ preaching in Simon's Boat," "Death of St. Mary Magdalen," and "Battle of the Alma" (1861). In 1863 he became professor of painting at the school of fine arts, and in 1868 he succeeded Picot as member of the academy.

PILSEN (Boh. *Plzen*), a city of Bohemia, situated where the Mies, Radbusa, and Uslawa unite to form the Beraun, 52 m. S. W. of Prague, on the West-Bohemian railway; pop. in 1870, 23,681. Among its buildings the chief is the deanery church of St. Bartholomew, a beautiful Gothic edifice of the 13th century; among its public institutions are a lyceum of high class, a theatre, and three hospitals. There are a Franciscan monastery, a convent of Premonstratensians, and several religious schools. Woollens, leather, watches, musical instruments, and iron wire are among the chief manufactures, and iron, coal, and alum are mined near by. Until a recent period Pilsen was called Neu-Pilsen, the little village of Alt-Pilsen, about 5 m. S. E., having sent out the founders of the present town about 1250. Alt-Pilsen is now called Pilsenetz. During the thirty years' war Pilsen was for a time the headquarters of Wallenstein. In the summer of 1866 it was occupied by a Prussian garrison. It is strongly fortified.

PIM, Bedford Capperton Trevylian, an English naval officer, born at Bideford, Devonshire, June 12, 1826. He began his career in the mercantile navy, and was subsequently employed in the naval surveying service. He made a voyage round the world in 1845–'51, was engaged in the search for Sir John Franklin, saved the crew of the Investigator, and was the first who ever succeeded in going overland from the E. to the W. side of the northwest passage. After serving in the Crimean war, and in China, where he was severely wounded, he engaged in efforts for the construction of a railroad across Nicaragua. He has published "The Gate of the Pacific" (London, 1863), and, in conjunction with Berthold Seemann, "Dottings on the Roadside in Panama, Nicaragua, and Mosquito" (1869).

PIMA, the S. E. county of Arizona, bounded N. by the Gila river, E. by New Mexico, and S. by Mexico, and intersected in the E. portion by the Rio San Pedro and Rio San Domingo, tributaries of the Gila, and by the Santa Cruz river; area, about 20,000 sq. m.; pop. in 1870, 5,716. The portion of the county W. of Tucson and S. of the Gila valley is uninhabited, except by the Papago Indians, who occupy a reservation near the Mexican border. This region consists of plains interspersed with broken or detached chains of mountains, and is covered with grass a part of the year, and considerable portions of it with mezquite, but it is deficient in water. The valley of the Gila, with irrigation, is very productive, and portions of it in this county are from 5 to 10 m. wide. The Maricopa and Pima Indians occupy a reservation 25 m. long in this valley, W. of the centre of the county. E. of Tucson the surface consists of plains, valleys, and broken chains of mountains. The greater part is covered with nutritious grasses, and live oak and mezquite abound. The valleys with irrigation produce two crops a year. Gold, silver, copper, and lead are found in the mountains. The greater portion of this county has been subject to the incursions of the Apaches. The chief productions in 1870 were 27,052 bushels of wheat, 32,011 of Indian corn, 54,997 of barley, and 3,417 of peas and beans. There were 200 horses, 482 milch cows, 786 other cattle, 803 sheep, and 692 swine; 2 flour mills, 1 brewery, and 1 saw mill. Capital, Tucson, which is also the capital of the territory.

PIMAS, a family of American Indians, including the Pimas proper, the Opatas, Eudeves, and Joves, and extending over Arizona, all of Sonora, and part of Sinaloa. The Opatas were the most advanced of these tribes, and showed the greatest aptitude for improvement, adopting white usages readily, and becoming mechanics. They have always been an agricultural people. They embraced Christianity at an early day and faithfully adhered to it. They still form an important part of the population of Sonora. The Eudeves and Joves were less advanced. The Pimas proper were divided by the Spaniards into Upper and Lower, and extended down into Sinaloa, a part of the tribe having emigrated thither in order to become Christians. The Pimas call themselves Otama (plural Ohotama). They were always restless, more savage and superstitious than the Opatas, and given to vice and drunkenness. They had a line of kings, the last of whom, Shontarlkorli, was killed a few years ago by the Apaches. They have settled villages, with about 30 dome-shaped, earth-covered huts in each, and separate granaries. They irrigate their fields by *acequias*, and raise and weave cotton, but force their women to do most of the field work, which is not the custom of the Opatas. They buried their dead in a sitting posture, burning their houses and goods. They make an intoxicating drink (*tiswin*) from the fruit of the cactus. Their pottery is rude, but their baskets are fine. Missions were established among the Pimas at an early period; but they frequently revolted against the Spaniards, especially in 1757, when the whole nation rose. They killed one Jesuit missionary in 1694, and two in 1751. Toward the end of the last century the Lower Pimas had 14 towns with 6 missions; the Upper, 22 towns with 8 missions; the Opatas, 27 towns; the Eudeves, 10 towns. The Pimas now within the limits of the United States in Arizona are on a reservation of 64,000 acres, set apart by the executive under the act of Feb. 28, 1859. They have degenerated greatly since the whites from the north entered their country, the men being thieves and the women corrupt. They numbered in 1874 about 4,000, industrious, agricultural, self-supporting, living in houses built by themselves, wearing civilized dress, and demanding the rights of citizenship; but their individual title to land has never been recognized. In the division of agencies the Pimas and Maricopas, who are on the same reservation, were assigned to the Reformed church, which appoints the agent, but has done little missionary work. A grammar of the Pima or Nevome was published in New York in 1862, and a grammatical sketch of the Heve language in 1861.

PIMENTO. See ALLSPICE.

PIMOS. See PIMAS.

PIMPERNEL, a name of doubtful origin, applied in England to two or three different plants, but in this country used only for *anagallis arvensis*, which is also the common pimpernel of England. The plant belongs to the primrose family, and is a low, spreading, much-branched annual, with stems about a foot long; opposite, broadly ovate leaves; and opposite, solitary, axillary flowers, on pedicels which are longer than the leaves and recurved after flowering; the corolla is wheel-shaped, five-parted; the many-seeded pod opens by a circular fissure, the top falling off like a lid; the usual color of the flower is scarlet, sometimes pink, white, and even blue. It is from Europe, and in the older parts of this country grows in sandy fields and sometimes in gardens; it occurs in most parts of the globe. As the flowers close at the approach of bad weather, it is known in England as the "poor man's weather glass." A blue-flowered form is sometimes cultivated, and other species, such as *A. fruticosa* and *A. Monelli*, have given rise to hybrids which are brilliant garden flowers, remaining expanded without sunshine.

Pimpernel (Anagallis arvensis).

PIN, a bit of wire, sharp at one end and headed at the other, used chiefly in the toilet for temporarily securing portions of the dress, and generally by seamstresses and tailors for fastening their work together. The need of little utensils of this sort has been met from ancient times by various devices. The pins mentioned in the Bible for fastening the hangings round the court of the temple were of metal. The Roman pins were usually of bronze, with variously shaped, ornamented heads; they were from one to eight inches long, and were sometimes made of ivory, bone, or wood. In the Egyptian tombs they are found much more elaborate and costly than the pins of the present time. They are usually of bronze, but some are of silver and gold. A collection of 25 bronze pins from Thebes is in the museum of the Louvre, and a number are in the Abbott collection in New York. They vary in length up to seven or eight inches, and are furnished sometimes with large gold heads, and sometimes with a band of gold around the upper end, those of the latter kind having probably been used for securing the hair. The ancient Mexicans found in the thorns of the agave convenient substitutes for metallic pins; and even the English, up to the middle of the 16th century, made use of rude skewers of wood, though they also made others of gold, silver, and brass to serve as pins. To that time they had depended upon the manufacturers on the continent for their supplies of the better sorts of pins, and this importation appears to have been established previous to 1488, when it was interrupted by a prohibitory statute. In 1543 an act of parliament provided "that no person shall put to sale any pins but only such as be double-headed and have the head soldered fast to the shank of the pin, well smoothed, the shank well shaven, the point well and roundly filed, canted, and sharpened." Three years later the manufacture was so much improved that the statute was of no importance. In Gloucester the business of pin making was introduced in 1626, and soon proved so prosperous that it gave employment to 1,500 persons. It was established in London in 1636, and afterward in Birmingham, which became the chief seat of this and similar manufacturing operations. In the United States the manufacture was first undertaken soon after the war of 1812, when in consequence of the interruption to commerce the value of a paper of pins was not less than $1, and these were of very inferior quality to those now worth only six cents a paper. The first attempt was made by some Englishmen at the old state prison, in what was then called Greenwich village, now a part of New York city. The enterprise was soon abandoned, and was again undertaken with the same tools in 1820 at the Bellevue almshouse, but again without success. In Massachusetts during the war a new machine was invented for facilitating the process, but little or nothing was done in the manufacture. In 1824 Lemuel W. Wright of Massachusetts patented in England, and introduced in a factory at Lambeth, London, some important machines of his invention, the first ever contrived for making solid-headed pins. But the company failed before these pins were introduced into the market, and the machinery was transferred to Stroud in Gloucestershire, where the manufacture was conducted by D. F. Taylor and co., and the first solid-headed pins were sold by this firm in London about the year 1833. In 1832 the new machines of John I. Howe of New York were patented in the United States. These were for making the pins with wire or "spun heads" like those imported from Europe, and were no doubt the first self-acting machines, in which the pin was entirely completed by one process, that proved successful. In 1836 they were put in operation by the Howe manufacturing company in New York. Their operations were transferred to Birmingham, Conn., in 1838, and soon included the new process of making pins with solid heads patented by Mr. Howe in 1840. Another factory was established in 1838 at Poughkeepsie by Slocum, Gellson, and co., making use of processes invented by Samuel Slocum for producing the solid-head pin; but their interests were finally transferred to the "American Pin Company," at Waterbury, Conn., where the business has long been successfully carried on in connection with the manufacture of hooks and eyes.—By the old methods of manufacture, which varied considerably at different times, the distinct processes usually numbered 14, commencing with straightening the wire, which had already been thoroughly cleaned, drawn down through a plate to the required size, and wound on a bobbin. The straightening was effected by drawing the wire quickly through the spaces between six or seven upright pins fixed in a table in a slightly waving line, adapted to the thickness of the wire. The wire was thus run out in lengths of 30 ft., which were cut off, and these were reduced to shorter lengths adapted for three or four or six pins. Pointing was done by grinding the ends upon stones or steel cylinders, called mills, 30 or 40 of the pin wires being held together in the hands and made to rotate as their ends were applied to the grinding surfaces. They were then cut into the right lengths, and the bits not pointed were returned to the pointer. The pin heads, made of a finer wire, were prepared by winding them by a lathe into a spiral round other wires. Three turns of the spiral being cut off furnished the head for one pin. The heads were annealed by being brought to a red heat, and then shaped by the blow of a hammer. Each one being taken up on a pin wire, and this introduced point downward in a hole in the centre of a die, a blow from a block hammer worked by a treadle secured the head to the pin. In Wright's machine for solid-headed pins there is a main shaft which moves a number of slides, levers, and wheels. A slider advances a pair of pincers which draws the wire, equal in length to a pin, from a reel, at every revolution of the shaft. The upper jaw of a die cuts off the wire and also opens a carrier which takes it to the pointing apparatus, where it is received by a revolving holder and subjected to the action of a rapidly revolving file wheel. A second carrier takes it to a finer file wheel for finishing. A third carrier takes the pin to the first heading die, where a steel punch forces one end into a recess and partially forms the head. A fourth carrier takes the pin to a second die, where the heading is completed. A forked lever then draws it from the die and drops it, the work of the machine being done. The pins are afterward whitened, polished, sorted, and stuck into papers. The whitening is done by first polishing in rotating barrels with sawdust, then placing them in kettles between perforated plates of tin in alternate layers, and boiling them in very dilute nitric acid for about three hours. This covers them with a thin coating of tin, when they are again rolled in a barrel with hot sawdust to smooth and polish them. Some of the pins are imperfect from roughness, and these are separated by a series of belts having an oscillating motion which discharges the smooth pins the fastest. They are sorted by means of a horizontally revolving wheel having different sets of steel fingers, each adapted to particular lengths of the pins.—Among the most important improvements in the manufacture are the machines for sticking the pins in papers. Until their introduction the pins were taken by the families living in the neighborhood, and fixed in the papers by the women and children at their houses. This was an inconvenient and wasteful method, and not easily carried out upon a large scale. The first improvement over the old English "hand bar" was the invention of Samuel Slocum, and consisted in a hand machine patented in 1840, and used at Poughkeepsie. Various improvements were made upon this by different inventors, and for 16 years or more the machine was in operation in the factory at Waterbury, and also at Birmingham, Conn. It is now superseded at both places by an improvement on a patent granted to Thaddeus Fowler of Connecticut. The pins are fed into a hollow cylinder which revolves on rollers, and are taken up in the compartments into which this cylinder is divided by means of longitudinal ribs extending along its inner surface. From these they drop upon an inclined plate, and sliding down this are caught in the links of an endless chain which passes along the lower edge of the plate. Each link is notched for as many pins as make a row, and each notch receives its pin hanging in it by the head. The whole row is then left together in the paper, when the link is carried forward to the proper position. The only attention the machine requires is to supply it with paper and pins.—Pins are also now made of iron and steel wire. To protect the metal from rusting it is lubricated with oil as it passes the last time from the draw plate. The manufacture is then conducted as with pins of brass wire. A factory in Connecticut produces them. Black pins for use with black dresses are prepared by japanning the common brass pins.

PINANG. See PENANG.

PINCKNEY, the name of a family of South Carolina. Thomas Pinckney, its founder, emigrated from Lincolnshire, England, in 1687, and settled at Charleston. He was wealthy, and had three sons, Thomas, Charles, and William, of whom the first named, an ensign in the 17th regiment, royal Americans, died young. Charles, commonly known as Chief Justice Pinckney, was educated in England, practised law in South Carolina, and in 1752 was made chief justice of the province and king's councillor. His wife was the first to attempt the cultivation of rice in the Carolinas. Chief Justice Pinckney went to England in 1753 to superintend the education of his children, remaining there five years, and died in Carolina about 1759. His remaining brother, William, born in Charleston in 1703, was master in chancery and commissary general of the province, and died in December, 1766. Of the descendants of Charles and William the following were the most distinguished. **I. Charles Cotesworth,** born in Charleston, Feb. 25, 1746, died there, Aug. 16, 1825. He was the eldest son of the chief justice, and at the age of seven was taken to England to be educated. He graduated at Christ Church college, Oxford, and studied law in the Middle Temple. He subsequently passed nearly a year in the royal military academy at Caen, France, and in 1769 returned to Charleston and commenced practice as a barrister. Almost immediately he became a participator in the preliminary conflicts of the revolution. He was a member of the first provincial congress of South Carolina, and in 1775 was elected colonel of one of the two regiments raised by the province. He served at the capture of Fort Johnson in Charleston harbor, and participated in the movements resulting in the defeat of the British fleet before Fort Moultrie. The war languishing in the south after this, he joined the American forces at the north as a volunteer, and as aide-de-camp to Gen. Washington was present at Brandywine and Germantown. He returned in the spring of 1778 to Carolina, and participated in the unsuccessful expedition to Florida. In January, 1779, he presided over the senate of South Carolina; soon after aided Moultrie in protecting Charleston against a greatly superior force of British regulars under Gen. Prevost; and in October, 1779, fought with great intrepidity in the disastrous assault upon Savannah. At the commencement of the siege of Charleston he held command of Fort Moultrie, which inflicted severe injury upon the British fleet. After the surrender of the city, which to the last he had opposed, he remained a prisoner, though part of the time on parole, until he was exchanged in February, 1782. After the evacuation of Charleston, Dec. 14, 1782, he returned there and resumed his practice at the bar. In 1787 he was a member of the convention which framed the constitution of the United States, and subsequently of that of South Carolina which ratified it; and again of the convention which in 1790 adopted the constitution of the state. In 1796 he was appointed minister to France. The directory treated him with marked disrespect, and finally ordered him to leave the country. He returned subsequently with Marshall and Gerry as associates, but negotiations went on slowly, and the American commissioners were at length given to understand that nothing would be accomplished until the government had received a present in money. Talleyrand submitted this proposition to them, intimating that the penalty of refusal would be war. "War be it, then!" replied Pinckney. "Millions for defence, sir, but not a cent for tribute!" On returning to the United States he was appointed a major general in the army in anticipation of war with France. In 1800 he was an unsuccessful candidate for president, receiving with John Adams the votes of the federal party. **II. Thomas**, brother of the preceding, born in Charleston, Oct. 23, 1750, died there, Nov. 2, 1828. He was educated in England, first at Westminster school, and afterward at Oxford, studied law in the Middle Temple, was admitted a barrister, and returned to South Carolina in 1770 after an absence of 17 years. In 1775 he entered one of the provincial regiments as lieutenant, became a major, and was aide-de-camp to Gen. Lincoln. He fought with distinction at the battle of Stono; and at the assault on Savannah he headed one of the assailing columns of the continental army. After the fall of Charleston he joined the army of Gates, and at the battle of Camden was desperately wounded, captured, and sent to Philadelphia, where he remained until the peace. In 1789 he was elected governor of South Carolina, and in 1792 received the appointment of minister to Great Britain, whence in 1794 he was transferred in the same capacity to Spain, where he negotiated the treaty of Ildefonso, by which the United States secured the free navigation of the Mississippi. He returned home in 1796, and was elected by the federalists to congress from the Charleston district in 1797, and again in 1799. In 1812 he became major general of the southern military division of the country, the duties of which involved the prosecution of war with the Creek and Seminole Indians. His last active field service was at the battle of Horse-shoe Bend, where the military power of the Creeks was finally broken. **III. Charles**, grandson of William, born in Charleston in 1758, died there, Oct. 29, 1824. He was educated for the bar, and when scarcely of age was chosen to the provincial legislature. At the capture of Charleston he became a prisoner, and remained such until near the close of the war, when he resumed his profession. In 1785 he was elected a delegate to congress from South Carolina, and he subsequently took an important part in the preparation of a plan of government for the United States. He was a member of the convention which framed the federal constitution, and in 1788 advocated its ratification in the South Carolina convention. In 1789 he was elected governor of the state. In 1790 he presided over the state convention by which the constitution of South Carolina was adopted. In 1791 and again in 1796 he was elected governor, and in 1798 United States senator. He was a frequent and able speaker on the republican side of that body, and was one of the most active promoters of Jefferson's election to the presidency in 1800. In 1802 he was appointed minister to Spain, and during his residence in that country negotiated a release from the Spanish government of all right or title to the territory purchased by the United States from France. In 1806 he was for the fourth time elected governor of South Carolina. In 1819–'21 he earnestly opposed the Missouri compromise bill in congress.

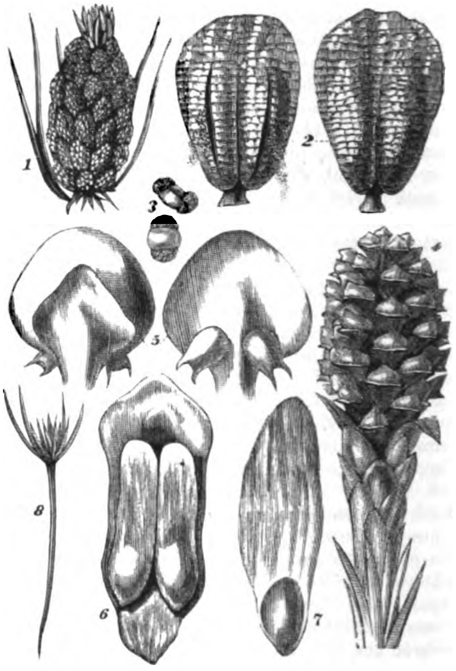
PINCKNEYA. See Georgia Bark.

PINDAR (Gr. Πίνδαρος), a Greek lyric poet, born in Thebes or in the village of Cynoscephalæ about 520 B. C., died about 440. The family to which he belonged was one of the noblest in Thebes. Pindar in his boyhood received lessons on the flute from the player Scopelinus, and his father sent him to Athens for instruction in the art, where he remained until about the age of 20. After his return to Thebes he received instructions from two poetesses, Myrtis and Corinna of Tanagra. Plutarch says the latter "advised him to introduce mythical narratives into his poems, as the music, rhythm, and elevated language were properly designed simply to adorn the subject matter. In accordance with her recommendation, he wrote a hymn, still extant in part, which was filled with nearly all the Theban mythology; whereupon she said: 'We ought to sow with the hand, and not with the whole sack.'" There is still extant an epinician ode written by Pindar in his 20th year in honor of Hippocles, a victor in the Pythian games. He rapidly acquired great reputation, and the different states of Greece and the tyrants of the colonies on important occasions applied to him to write choral songs. About 473 he visited Syracuse, where he remained about four years. The poems of Pindar consisted of epinicia or triumphal odes, hymns to the gods, pæans, dithyrambs, odes for processions, songs of maidens, mimic dancing songs, drinking songs, dirges, and encomia or panegyrics on rulers. The only entire poems that have come down to us are the *Epinicia*, which were all written in honor of victories gained in the public games, with the exception of the 11th Nemean, composed when Aristagoras was installed in the office of *prytanis* at Tenedos. The triumphal odes are divided into four books, corresponding to the four great public games of Greece. The mythical element is always prominent in them. Pindar was himself a strict worshipper of the gods, and appears to have placed credence in the marvellous and supernatural accounts of Greek legendary history; but he either formally repudiates or does not recount the quarrels between the divinities, and all stories representing the gods as guilty of wicked acts. Although the odes were sung by a chorus, the poet was supposed to speak in the first person, and Pindar availed himself of this circumstance to give advice to the victor, to defend himself against the attacks of enemies, and to assail rival poets. The *editio princeps* of Pindar was printed at the Aldine press of Venice (8vo, 1513), along with Callimachus, Dionysius, and Lycophron. The best editions are those of August Böckh (2 vols. 4to, Leipsic, (1811–'21), containing a commentary and dissertations upon the music, metres, and lyric poetry of the Greeks, and of Mommsen (Berlin, 1864–'6), who also translated the poems of Pindar. There are English translations by the Rev. H. F. Cary (London, 1833), F. A. Paley (1869), and Myers (1875).—See Villemain, *Essai sur le génie de Pindar* (Paris, 1859); Mommsen, *Kritik, Exegese und Versabtheilung bei Pindar* (Oldenburg, 1863); Camarda, *Osservazioni alle parole di Pindaro* (Messina, 1873); and Lehr, *Die Pindarscholien* (Leipsic, 1874).

PINDEMONTE. I. Ippolito, an Italian poet, born in Verona, Nov. 13, 1753, died there, Nov. 18, 1828. He was educated at the college of Este and at Modena, travelled through France, Germany, Holland, and England, resided for a time in Malta and Sicily, and finally settled in Avesa near Verona. His chief works are: *Poesie campestri* (1785), to which, in a later edition, he added prose essays, making the title *Prose e poesie campestri* (1795); *Arminio*, a tragedy (1804); *Sermoni* (1805), satires upon the follies of the times; a translation of the Odyssey into blank verse (part appearing 1809, completed 1822); *Epistole in versi* (1819); and *Elogi di letterati* (1825–'6), a volume of literary biographies. **II. Giovanni,** elder brother of the preceding, born in Verona in 1751, died Jan. 23, 1812. During the Napoleonic period he was a member of the legislative body of the kingdom of Italy. He wrote many dramatic works, among them *I Baccanali*, and translated Ovid's *Remedia Amoris*. His dramas were published as *Componimenti teatrali* (4 vols., Milan, 1804).

PINDUS, in ancient geography, a range of mountains in northern Greece, a part of which, properly so called, separated the provinces of Thessaly and Epirus. The name is also used in modern geography. (See GREECE, vol. viii., p. 186, and TURKEY.)

PINE (Lat. *pinus*), the most numerous genus among coniferous trees, distinguished from all others by its foliage, which consists of needle-shaped leaves in clusters of two to five, surrounded at the base by some of the withered bud scales which form a sheath around them. Some authors include in the genus *pinus* the trees known as firs, spruces, hemlock spruces, cedars, larches, &c. (which most botanists place in separate genera), making so large a genus that these rank as subgenera; in this case the subgenus including the pines is characterized by the arrangement of the leaves just referred to. American botanists keep the genera distinct, and include in *pinus* only those which have the clustered leaves, a character accompanied by others of more botanical importance. These needle-shaped leaves, which make up the foliage of the pines, are not the first leaves produced upon the stem; if the young growth of a pine be examined, it will be found clothed with thin chaff-like scales, the primary leaves of the stem, from the axils of which appear the clusters of green, needle-like leaves, which are really suppressed branches, as may be seen more distinctly in the larger clusters of the larch. When there are but two leaves in a cluster they are semi-cylindrical, and when there are three or more they are triangular. The male catkins are clustered at the base of the shoot of the season; the flowers are reduced to a single stamen, having a very short filament with its connective (or part of the filament to which the anther cells are attached) expanded to form a scale, and the sterile catkins really consist of numerous overlapping anthers, crowded on an axis; the two anther cells open lengthwise and discharge an abundance of pollen, which consists of three united grains. The fertile or female catkins are immediately below the terminal bud, or lateral

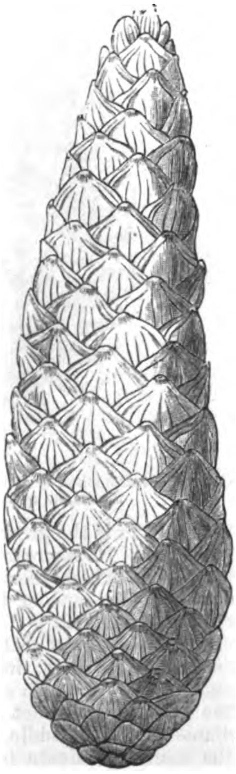


Pine—Flowers and Seed.—1. Staminate aments. 2. Anthers, front and rear view. 3. Pollen. 4. Pistillate ament. 5. Open pistil, the left-hand figure showing the back with attached bract, the other the front with ovules. 6. Ripe pistil or cone scale, with the ovules developed into seeds. 7. Seed. 8. Germinating embryo with several cotyledons.

on the young shoot, solitary or several together, consisting of numerous imbricated capillary scales (or open pistils), each in the axis of a persistent bract; at the base of each scale is a pair of ovules which are inverted, *i. e.*, have the foramen or structural apex pointing downward. In ripening to form the cone the scales of the catkins become hard and woody, and with some exceptions thickened at the apex; each has at its base two nut-like seeds, which are more or less sunk in cavities at the base of the scale; when the seed leaves the scale it usually carries away a portion of the lining attached to it as a wing, much more conspicuous in some species than in others. The cones do not mature until the autumn of the second year after flowering; when perfectly ripe and dry the scales spread apart to liberate the seed, after which in some species the cones themselves fall, but in others they are persistent. The embryo has more than two cotyledons, sometimes as many as 12; some botanists regard these as two cotyledons divided.—The pines, with the exception of one species in the Canaries, are confined to America, Europe, and Asia, and are more abundant in the temperate and cooler portions of these, where they form large forests. No trees are so useful to the arts of civilized life as these, as they not only furnish in abundance kinds of wood for which there is no proper substitute, but their other products are of great utility; the abundant juice of some species, which consists of a resin dissolved in a volatile oil, affords turpentines of various kinds, spirits of turpentine, rosin, tar, pitch, and other minor products. In several species the nuts are edible, and are not only eaten by wild animals but collected for food. In ornamental planting pines are exceedingly useful, as they present a great variety of habit and foliage, from species which never rise above a few feet up to those with trunks large enough for a ship's mast.—In arranging the species of the Atlantic states according to the number of leaves in a cluster, but one is found with its leaves in fives, viz., *P. strobus*, the common white pine; in England, from its having succeeded admirably at the seat of Lord Weymouth, who planted it largely, this is universally known as the Weymouth pine. It extends from about 54° N. to the mountains of Georgia, and from Nova Scotia to the Rocky mountains, and in the north it reaches nearly to the Pacific. Along our northern borders it once formed extensive forests, but the few of these which still remain yearly diminish before the lumberman's axe; it is the tallest tree of the eastern states, specimens of 120 to 150 ft. being common in the primitive forests, and some have been felled which measured 223, 250, and 264 ft.; growing in the dense forest where nature does her own pruning, a clear trunk of 70 to 90 ft. without a branch was formerly not rare; the forests of Maine have furnished many masts of these lengths. The bark, except upon old trunks, is quite smooth; the cones, which are cylindrical and narrow and often curved, are 4 to 6 in. long, and fall soon after shedding their seed; they are unlike the cones of all other species of the same region in having their scales scarcely if at all thickened at the apex, and wholly destitute of any point or prickle; these characters of the cone and the five leaves in the cluster readily distinguish it from any other species. In some specimens the wood of the white pine is quite free from resin, while others contain a considerable quantity; for these peculiar differences the lumbermen have distinguishing names, such as pumpkin pine, bull sapling, &c., which are not known elsewhere; the wood, though lacking in strength and decaying readily when exposed, is so easily worked, and receives paint so well, that it is adapted to a wide range of uses, and is in more general demand than any other wood, especially for interior work; its lightness and the great length of clear trunk it affords make it suitable for masts, and for the framework of bridges and buildings. While the trunk soon decays when exposed, the roots are remarkably durable, and in clearings remain perfectly sound after those of trees with much more durable wood have disappeared. As a tree for planting for timber, it has great value, as it is of very rapid growth, instances being known in which the annual increase of the trunk in diameter was nearly an inch; besides this, its timber is increasing in value as the native forests rapidly disappear. It is much prized as an ornamental tree, being perfectly hardy and

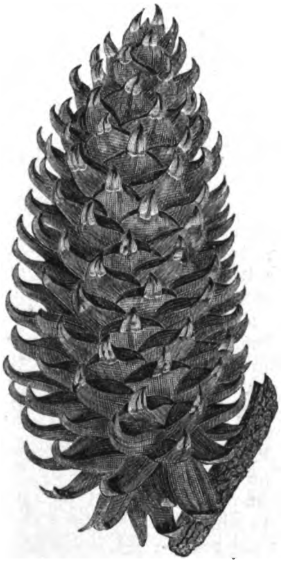
White Pine (Pinus strobus).

succeeding in any location not too damp; its light open top makes it less majestic than some other pines, but it has a grace and beauty not possessed by them; its color is in fine contrast with that of other species, and its long leaves, always kept in motion by the air, make a pleasing sound. There are varieties with silvery foliage, and a dwarf variety which forms a broad flat top.—In the section of pines with three leaves in a sheath we have four species, the most valuable of which is the long-leaved or southern yellow pine (*P. australis*), which for usefulness ranks next to the white pine; it is readily distinguished from all our other pines by the great length of its leaves, which measure from 10 to 15 in., are bright green, from a long light-colored sheath, and are crowded at the ends of the branches; the cones, often 10 in. long, are of a fine brown color and have thick scales, each of which bears a small recurved prickle. This species, which extends from North Carolina southward, often forms the entire growth on large tracts known as pine barrens, which are especially abundant in Georgia and Florida; it is rarely found over 120 m. from the coast; its average height is about 75 ft.; the naked trunk shoots up 50 or 60 ft., dividing at the top into a few spreading branches; the trunks for two thirds of their height have an average diameter of 15 to 18 in.; the scales of the bark are very thin. The trunk has a remarkably small proportion of sap or new wood, the greater portion being heart, with the concentric circles of very equal width, and the wood very evenly charged with resin; the quantity and color of the wood is much modified by the character of the soil; it is very strong, compact, and durable, and being close-grained takes a fine polish; under the name of Georgia pine, it is in great demand for ship building, flooring, and other uses, and is sometimes used for interior work, simply varnished, and in time it takes on a warm reddish brown color. As with other very resinous pines, whenever the tree is injured and vegetation ceases, the wood in a few months becomes surcharged with resin, and is then called "fat pine;" this often takes place where a branch is broken off, the resinous deposit continuing to the heart of the tree and forming a pitch knot. Besides the great value of the wood, still more important are the products known as naval stores, turpentine, rosin, tar, and pitch, the preparation of which is described under their proper titles. Among the minor uses to which the tree is put is that of a substitute for brooms, the tuft of long leaves at the end of a branch of a young tree serving when tied for that use, whence it is sometimes known as the broom pine. The fat wood, especially the knots, are very generally used by the poorer classes in the pine districts for illuminating purposes. The seeds, which in all the rest of our pines are black, have a white skin, and the kernel has a pleasant flavor; they are not produced every year, but in fruitful seasons they are shed in great abundance in October, and are greedily eaten by swine, wild turkeys, and other animals. The fallen leaves, which cover the ground in immense quantities, are known as pine straw; it has been proposed to compress them into blocks for fuel, and attempts have been made to convert them into a fabric.—Another southern species of the three-leaved section is the loblolly, or old-field pine (*P. tæda*), which occurs from Delaware to Florida, growing in less sterile soil than the long-leaved pine. One of its common names expresses the fact that it springs up in old fields; the land, having been cultivated until it is no longer profitable, is thrown out to be taken possession of by this tree and numerous weeds. The tree grows 80 or 100 ft. high, with a diameter of 2 or 3 ft., and has a wide-spreading top; the bark is thick and furrowed; the light green leaves 6 to 10 in. long; the elongated-oblong cones 3 to 5 in. long, the scales tipped with a stout incurved spine. The trunk has a very small heart, and the timber is of very poor quality; though it shrinks, warps, and cracks badly, it is considerably used in the southern states for building. This species is hardy at Philadelphia.—The pitch pine (*P. rigida*) ranges from Maine to Georgia, and is found in a great variety of situations and under very different forms; while in some northern localities it is only 12 or 15 ft. high, in other places it forms a large tree 70 ft. high; the trunk has a very rough dark-colored bark; the leaves are 3 to 5 in. long, very dark green, with short sheaths; the cones, often in clusters, are ovate, 1 to 3½ in. long, the scales with a stout recurved prickle. Sometimes the tree forms a clear trunk, and the wood is soft and nearly free from resin, but generally the wood contains a large amount of resin, and consequently is very hard; when vigorous growth ceases the wood becomes fat, or pitch wood, as in the long-leaved pine; the wood is much used in ship building, for water wheels, pump and water logs, and many other uses; formerly, when more abundant, tar and lampblack were made from it. The dark green of the foliage is pleasing, but there are so many other pines superior to it that it is not to be commended for ornamental planting. The pond pine, which some botanists rank as a species (*P. serotina*), is probably only a variety of the pitch pine (*P. rigida*, var. *serotina*), the principal difference being that it has somewhat longer leaves and more rounded cones; its wood is of little value.—Among our pines having the leaves two in a sheath, only two species are of much economical value. The yellow pine, or, to distinguish it from the southern yellow pine, the short-leaved yellow pine (*P. mitis*), grows from New Jersey to the gulf of Mexico, and is usually from 50 to 60 ft. high, though specimens have reached 90 ft., with a straight trunk, and, where it can develop, a handsome conical head, which has caused it to be called in some localities spruce pine; the slender leaves from long sheaths, 3 to 5 in. long, sometimes occur in threes, connecting this section with the preceding; the ovate cones are barely 2 in. long, the scales with a minute prickle; the wood is fine-grained, and, when deprived of the readily perishable sap wood, remarkably durable; it is used for ships' masts and spars, and for flooring, and is in demand for various purposes at home and abroad; that grown upon poor soil is more durable than that grown on a more fertile one. The fine shape of this tree, and the peculiar bluish green of its foliage, make it one of the most ornamental of our native pines. The red pine (*P. resinosa*) is found from Canada to Pennsylvania in dry localities; in New England it is often incorrectly called Norway pine, a name which belongs to a European spruce. The tree seldom forms forests, but is scattered among other species, and in favorable localities reaches 80 ft., with a trunk of very uniform diameter; the bark, much less rough than that of the pitch pine, is red; the leaves, 5 to 6 in. long, are of a rich dark green and much crowded at the ends of the branches, giving the tree a distinct character, unlike that of any other northern species; the cones, about 2 in. long, are ovate, terminal, and fall after shedding the seed, the scales without any prickles; the wood is less resinous than that of the pitch pine, and is in strength and durability intermediate between that and white pine. The young trees are especially handsome and worthy of a place in large plantations.—The Jersey or scrub pine (*P. inops*) occurs in poor sandy soil from New Jersey westward and southward, rarely growing more than 30 or 40 ft. high, and is of a straggling habit; the old bark is dark and rough, while that on the young branches is covered with a purplish or violet bloom; the leaves 2 to 3 in. long; cones 2 to 3 in. long, oblong conical, the scales tipped with a recurved or straight, awl-shaped, rigid prickle; the tree is of little value. The gray or northern scrub pine (*P. Banksiana*) is found along our northern border, and extends further northward than any other of our pines, growing within the arctic circle; it sometimes reaches 20 or 30 ft., but is usually much lower, frequently straggling over the ground and only 3 to 5 ft. high; its leaves are an inch long, grayish green, and the usually curved cones not over 2 in. long; the wood, said to be very light and tough, is used by the Indians in constructing canoes. The spruce pine (*P. glabra*) is a little known and very local species in South Carolina and Florida; it is 40 to 60 ft. high, with leaves 3 to 4 in. long, and cones about 2 in. long; it branches from the ground, and has a smoothish bark and a soft white wood. The only remaining eastern species is the Table mountain pine (*P. pungens*), which is restricted to the mountains of North Carolina, Virginia, and a few localities in Pennsylvania; it grows 40 to 50 ft. high; the leaves, which are stout, are about 2½ in. long, of a bluish color; the ovate cones 3 in. long, the scales with a very strong hooked spine. This is distinguished from all other pines by the length of time the cones remain upon the tree; they may often be found attached to branches of 20 years' growth. The species has no especial value.—The pines of the Rocky mountains and westward to the Pacific are more numerous than in the eastern region, and, especially those accredited to Mexico, are in much botanical confusion, from which the monograph on the genus in preparation by Dr. Engelmann is expected to extricate them. Only the more important species are enumerated, and these are grouped, like the others, according to their leaves. Among the species with quinate leaves, or five in a cluster, the awn-coned pine (*P. aristata*) is noticeable for its truly alpine character, it being found on the higher peaks of the Rocky mountains, never at less than 9,000 ft. altitude; it occurs as a straggling bush, or as a tree of 40 or 50 ft., according to situation; its leaves are from 1 to 1½ in. long, and remarkably persistent, remaining on the tree in some cases for 16 years; the oval cones, about 2½ in. long, have each scale terminated by a slender, incurved point; the tree is of very slow growth and long life, a branch about an inch in diameter showing 50 annual rings, and the wood of the larger trees shows an age of about 500 to 800 years. The American Cembran pine (*P. flexilis*), so called because it is the representative in this country of the Cembran pine of the old world, is also an inhabitant of the alpine regions of the Rocky mountains at from 7,000 to 11,000 ft.; it has much the appearance of the eastern white pine, with white, hard, slowly grown wood; it rarely grows over 50 ft. high; has cones 4 or 5 in. long with edible seeds. The sugar pine (*P. Lambertiana*) is found from the Mexican border, along the mountains, to the Columbia river; this is one of the grand trees of the Pacific region, in groves growing 200 ft. high

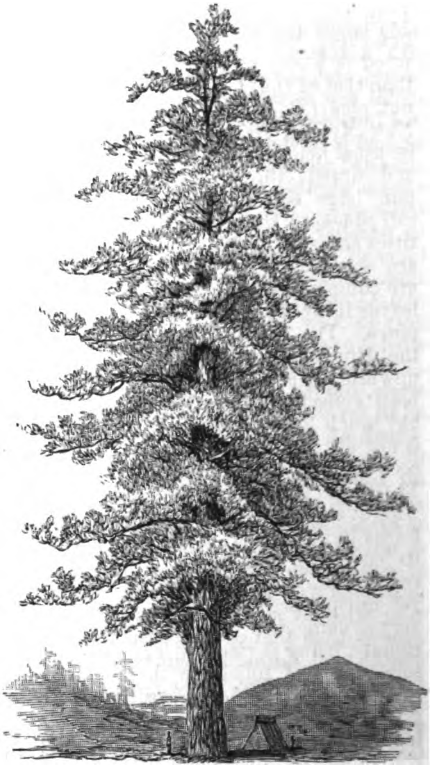


Cone of Sugar Pine (Pinus Lambertiana).

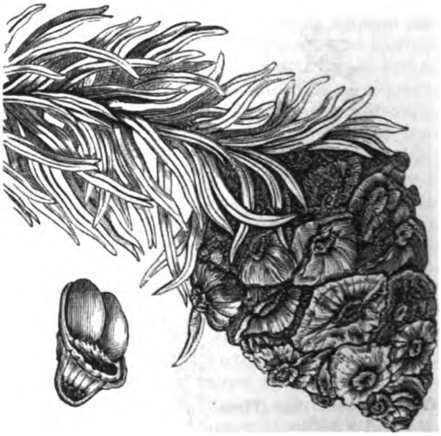
and 10 ft. in diameter, and isolated specimens reach 300 ft. with a diameter of 20 ft.; the leaves, about 3 in. long, are bluish green; the cones are from 12 to 18 in. long, 3 to 4 in. in diameter, slightly curved, and with thin scales; seed edible. The wood, much like that of the white pine, is preferred for inside work to all others of the region; the resin is clear, and that which exudes from partly burned trees loses all terebinthinate taste, and becomes sweet; it is used as a substitute for sugar, but oftener for its slightly cathartic properties, in which as well as in appearance it resembles manna. The tree promises to be valuable in cultivation in the eastern states. The mountain pine (*P. monticola*) is another species much resembling our white pine, and common in the mountains of northern California and Oregon.—Among the prominent species with three leaves is the great-hooked pine (*P. Coulteri*, Don; *P. macrocarpa*, Lindl.), about the identity of which there has been some discussion, some regarding it as only a variety of Sabine's pine. It is found in the mountains of various parts of California, where it grows 80 to 100 ft. high; its leaves are 9 in. long, and the cones, which are the largest of any in the genus, are a foot or more long, 6 in. in diameter at the middle, and weigh about 4 lbs.; the scales terminate in a recurved and compressed spine 3 or 4 in. long; the large and flat seeds are edible. Sabine's pine (*P. Sabiniana*), also called nut pine in California, is another species with enormous edible-seeded cones; it is found very generally in California and extends into Oregon. It has a more spreading habit than most pines; leaves 10 to 14 in. long; cones 8 to 10 in. long, the scales ending in a sharp curved point; the wood is not especially valuable, but the seeds are of great importance to the Indians, who depend upon them for a large part of their food. The western yellow pine (*P. ponderosa*) is the most



Cone of Great-hooked or Coulter's Pine (Pinus Coulteri), about one quarter natural size.

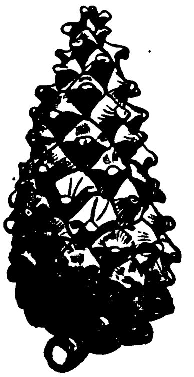


Western Yellow Pine (Pinus ponderosa).



Cone of New Mexican Nut Pine (Pinus edulis).

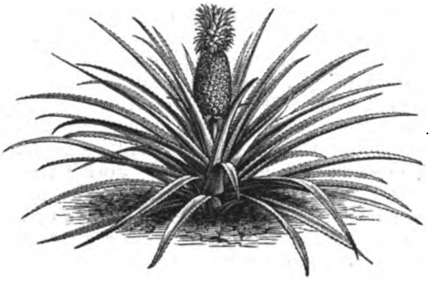
abundant and most widely distributed of the pines of California and Oregon, and often grows 100 ft. high; its leaves are from 9 to 12 in. long and much tufted at the ends of the branches; the ovate cones 3½ in. long; the wood is heavy and resinous, but less valuable than that of the sugar pine. The New Mexican nut pine (*P. edulis*) is abundant in parts of New Mexico, Arizona, and northern Mexico; its usual height is about 30 ft.; its foliage short and curved; the cones, scarcely 2 in. long, contain large edible seeds, which the Mexicans call *piñones;* these are collected in large quantities and sold at fairs and festivals as peanuts are with us.—Several extra-American pines are common in cultivation; of those with the leaves in fives are the Bhotan and Swiss stone pines. The Bhotan pine (*P. excelsa*) is from the Himalaya at elevations of 6,000 ft. and upward; it is so like our white pine as to have been considered a variety of that species; it has much longer leaves and a denser habit; it is not altogether hardy, but where it will succeed it is one of the most ornamental of pines. The Swiss stone pine (*P. Cembra*) is from the Alps at elevations of 4,000 ft. and over, where it forms large forests; its height is about 50 ft.; its leaves are 2 to 3 in. long, and its ovate erect cones 3 in. long; these, when full grown and yet unripe, are of a bright purple color and very ornamental. The tree is well suited to our climate, being perfectly hardy, forming a handsome cone of foliage, with branches quite to the ground; its chief objection is its very slow growth; its variety *pygmæa* seldom grows higher than 3 ft. The remaining exotic pines cultivated for ornament belong to the two-leaved division; the best known of these is the Scotch pine (*P. sylvestris*), more commonly but incorrectly called Scotch fir; it is widely distributed over northern and central Europe and Russian Asia; it is indigenous to the highlands of Scotland, and is naturalized in parts of England; it occupies a similar position as to usefulness to that of the white pine with us, and besides its supplying timber, large quantities of tar are made from it in northern Europe; it is a very rapid grower; its leaves, from 1½ to 2½ in. long, are bluish green, and twisted; the cones from 2 to 3 in. long, curved at the point. It adapts itself to a great variety of situations, but, being more picturesque than beautiful, is not suited to small places. The Austrian pine (*P. Austriaca*), from the mountains of Lower Austria and neighboring countries, grows in its native localities 120 ft. high, and is much valued for its timber; its leaves, from 3 to 5 in. long, are straight, rigid, and dark green; the cones about 3 in. long, conical, of a rich glossy brown. The tree has an exceedingly robust expression, which makes it very effective, and it is generally hardy and successful in all situations. Among the other exotic pines desirable for cultivation are the Corsican (*P. laricio*), the Mugho pine (*P. Mugho*), a dwarf, the stone pine (*P. pinea*), the dwarf pine (*P. pumilio*), and the Pyrenean pine (*P. Pyrenaica*), an account of which, and of numerous other less known species, and their adaptability to our climate, will be found in "The Book of Evergreens," by Josiah Hoopes (New York, 1868).—Pines are usually propagated from seeds, which should always be kept in the cones until sown; young pines, like other seedling conifers, are very delicate the first year, and need shading and protection from excessive moisture. Pines can very seldom be raised from cuttings, but the rarer kinds are sometimes grafted upon seedlings of the commoner species, it being important to choose as stocks those which have the same number of leaves in a cluster with the one to be grafted. Our nurserymen have the seedlings which are to serve as stocks potted, and insert the scion by means of a side graft, keeping the pots under glass until the union is well established. In France the herbaceous graft is practised, grafting young and succulent wood upon a stock in a similar condition. Pines which have been raised in a nursery and frequently transplanted, may be removed with as much certainty as other trees, provided their roots are properly packed; if the resinous sap in the roots is once allowed to dry, no care can save the tree.



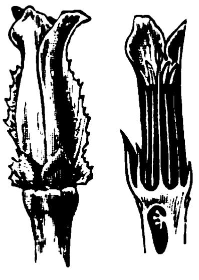
Cone of Scotch Pine (Pinus sylvestris).

PINE, an E. county of Minnesota, separated on the S. E. from Wisconsin by the St. Croix river; area, about 1,450 sq. m.; pop. in 1870, 648. It is watered by Kettle and Snake rivers and other tributaries of the St. Croix, and is traversed by the Lake Superior and Mississippi railroad. The land is rolling, elevated, and productive. Capital, Chengwatana.

PINEAPPLE, a tropical fruit, so called from its resemblance in form and external appearance to the cones of some species of pine; its botanical name in most general use is *ananassa sativa*, but some botanists who do not regard it as distinct from *Bromelia* call it *B. ananas*. The *Bromeliaceæ*, to which it belongs, are a small family of endogenous plants, quite nearly related to the canna, ginger, and banana families, and differing from them in having nearly regular flowers, and six stamens all perfect; they are generally stemless and mostly epiphytes in the forests of tropical America; some of the bromelias, bilbergias, and others are brilliant hothouse plants; and the family is represented in our southern states by several species of *Tillandsia*, one of which, a slender branching species, extends northward to the Dismal swamp in Virginia, and is popularly



Pineapple (Ananassa sativa).



Flower of Pineapple, with Section.

known as long moss. As the pineapple has become naturalized in parts of Asia and Africa, its American origin has been disputed, but there is little doubt that it is a native of Brazil, and perhaps of some of the Antilles; the aboriginal South American name was *nanas*, from which the Portuguese derived *ananas*, a name which it holds in most European languages, and with a different termination serves for the genus. The pineapple is a biennial, with the habit of an aloe, but with much thinner leaves, which form a crown of foliage, each leaf being handsomely recurved, and furnished upon its edges, except in one variety, with small sharp spines; from the centre of the cluster of foliage arises a stem 2 or 3 ft. high, on the upper portion of which the flowers are crowded in the form of a conical spike; each flower consists of three outer divisions, or calyx and three inner, much longer, and petal-like divisions, all attached to the (inferior) three-celled ovary; six stamens, and three styles; each flower is placed in the axil of a bract, the upper bracts, which are without flowers, developing at the top of the stem as a crown of small crowded leaves. The pineapple in cultivation rarely produces seeds, but in ripening the whole flower cluster undergoes a remarkable change; all parts become enormously enlarged, and when quite ripe, fleshy and very succulent, being pervaded by a very saccharine highly flavored juice. Instead of being a fruit in the strict botanical sense of the term, it is an aggregation of accessory parts, of which the fruit proper, the ripened ovary, forms but a small portion; in this succulent mass, gorged with juice and blended together, are the central stem, the bracts, calyx, corolla, and ovary, all much diverted from their normal form, and together making what is called a syncarpous or collective fruit; indeed, the pineapple is analogous in structure to the mulberry, though that ripens its seed. Upon the exterior tessellated surface of the pineapple can be traced the tips of the bracts which support the flowers, and the points of the petals; a careful dissection will show all the parts of the flowers, though greatly distorted, and even the stamens may be frequently detected. The first pineapples known in England were sent as a present to Cromwell; the first cultivated in that country were raised about 1715, though they were grown in Holland in the previous century. The successful cultivation of the pineapple was formerly considered one of the highest achievements in horticulture, and the works of a few years ago are tediously elaborate in their instructions; but the matter has been of late so much simplified that any one who can command the proper temperature and moisture may expect success. Pineapples are taken from the West Indies to England in considerable quantities, but the fruit is so inferior to that raised under glass that its cultivation for market is successfully prosecuted. The price quoted in London in April, 1875, was 3*s*. to 6*s*. a pound, while the whole imported fruit was sold at about half a crown. The largest fruit on record as the produce of the English pineries weighed 14 lbs. 12 oz. Better West Indian pineapples are sold in our markets than in those of England, as we are nearer the places of growth, but the fruit raised under glass is greatly superior to the best imported specimens. In 1874 there were sent to New York 4,937,125 pineapples, of which 1,484,678, or about 30 per cent., perished on the voyage. Of these, 25 full cargoes came from Eleuthera, 21 from San Salvador, 15 from Harbor island, and a smaller number and parts of cargoes from about a dozen other ports. The business of canning pineapples is largely pursued at Nassau, New Providence, whence many are also exported whole, both to England and the United States.—More than 50 varieties are enumerated, and among these Lindley thought were those sufficiently distinct to be derived from four different species; the plant is evidently very variable, and when South America was first visited by Europeans, they found the natives cultivating three distinct varieties or species. New varieties are obtained from seed, which the cultivated plant on rare occasions perfects, but which the partially wild plants afford more abundantly; while established sorts are propagated by means of the suckers produced freely by most varieties, or by the crowns, which are less desirable than suckers, not producing fruit so soon; some varieties with proper management will be in fruit in about 18 months from the time the suckers are rooted. Among the most esteemed varieties, the Queen, smooth-leaved Cayenne, Charlotte Rothschild, and Prince Albert are regarded as the best and freest fruiting. Aside from its use as a dessert fruit in its whole state, large quantities are canned in Jamaica and other localities for exportation. The juice is used in considerable quantities in flavoring ices and sirups for soda water; the expressed juice is put into bottles, heated through by means of a water bath, and securely corked while hot; if stored in a cool place, it will preserve its flavor perfectly for a year. The unripe fruit is exceedingly acrid, and its juice in tropical countries is used as a vermifuge. The variegated pineapple (*A. sativa variegata*), of unknown origin, has leaves 2 or 3 ft. long, green in the centre, margined with a rich cream color, and tinged with red on the edges; it is a most effective decorative plant for the hothouse in winter, or for a vase in the open air in summer.—The leaves of the pineapple contain an abundance of strong and very fine fibres, which are sometimes woven into fabrics of exceeding delicacy and lightness; it is probable that the fabrics advertised as pineapple goods are from the fibres of other *Bromeliaceæ*, of which there are many, especially the so-called wild pineapple, *Bromelia pinguin*, with leaves 5 to 8 ft. long, abounding in fibre, remarkably fine in the young leaf.

PINEL, Philippe, a French physician, born at the château de Rascas, near Lavaur, Languedoc, April 25, 1745, died in Paris, Oct. 26, 1826. He was the son of a physician, and studied in several colleges, supporting himself meanwhile by private teaching. In 1778 he went to Paris, where he gave lessons in mathematics, and wrote for the medical and philosophical journals. His proposal for a new classification of animals, based on the formation of the jaw bone, gave him much reputation. In 1785, taking charge of a private asylum for the insane, he tried with success for six years the substitution of gentle measures for the harshness then almost universally practised. In 1791 he obtained a prize from the society of medicine for the best essay on the treatment of insanity (*Traité médico-philosophique sur l'aliénation mentale*), and in 1792 was appointed physician of the Bicêtre, which was a prison, almshouse, hospital, lunatic asylum, and nursery, all in one, the different classes of inmates mingling with one another. It was crowded almost beyond endurance, and in bad condition. All the arrangements of the asylum were changed by Pinel. Cruelty had rendered the insane patients so ferocious that no one durst set them at liberty. The number of cures he accomplished, even among these chronic cases, astonished the profession; and his method of treatment has been adopted in all civilized countries. (See INSANITY, vol. ix., p. 298.) In 1795 he was transferred to the Salpêtrière, a similar institution for females. His writings on diseases of the mind gave the first decided impulse to the proper investigation of insanity. His work on the classification of diseases (*La nosographie philosophique*, 1798) was almost equally famous. Besides the works already named, he was the author of many treatises on insanity and cognate topics, and several on subjects connected with animal mechanics.

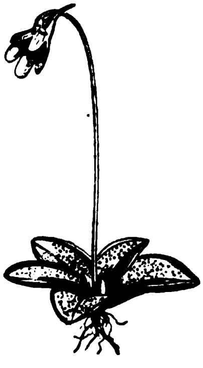
PINEROLO, or **Pignerol**, a city of Piedmont, Italy, on the Clusone, in the province and 20 m. S. W. of the city of Turin; pop. in 1872, 16,730. It has a cathedral and five other churches, and manufactories of silk, wool, cotton, liqueurs, vermicelli, &c. It came into the possession of the house of Savoy in 1042, but was several times conquered by the French, who held it from 1586 to 1574, from 1631 to 1696, and from 1796 to 1814. The conquerors during the 17th century considerably strengthened its fortifications, but dismantled them on being obliged to give it up. The Man in the Iron Mask is said to have been for a time confined in the citadel here.

PINES, Isle of. **I.** An island (Sp. *isla de Pinos*) in the Caribbean sea, 33 m. off the S. W. extremity of Cuba; length 43 m., greatest breadth 35 m.; area, 1,200 sq. m.; pop. about 2,000. The coasts are deeply indented by bays and inlets, some of which afford commodious anchorage, though surrounded by innumerable rocky islets or keys. A mountain chain traverses the island, the Sierra de la Cañada, over 1,600 ft. high, and sends off two spurs: that of the Daguilla, 1,500 ft., and the Sierra de los Cabellos, over 1,000 ft. The country is well watered by several rivers, some of which, particularly those of las Nuevas and Santa Fé, are navigable 5 m. inland by craft drawing 10 ft. Among the mineral productions are silver, quicksilver, iron, sulphur, and rock crystal; and marble of various beautiful colors occurs in large quantities. The centre is somewhat marshy, but the soil is elsewhere very fertile. Timber and precious woods are very abundant; and the cultivated products are the same as those of the Western department of Cuba. The climate being extremely mild and salubrious, the island is a common resort for invalids. Nueva Gerona, capital of the colony of la Reina Amalia, had in 1870 about 100 inhabitants. Other towns are Santa Fé and Jorobado. The colony is governed by a resident political and military commandant, under the jurisdiction of the political governor of Havana. The island was discovered by Columbus in 1494, and was long the favorite haunt of pirates, among whom was Gibbs. **II.** An island (Fr. *île des Pins*) in the S. Pacific, belonging to France, about 12 m. in circumference, lying off the S. E. extremity of New Caledonia, of which it is a dependency, in lat. 22° 38′ S., lon. 167° 25′ E.; pop. (exclusive of convicts sent since 1872) estimated at 800. The greater part of the surface is a dry plateau, but in the S. E. part a single peak, the mountain of N'gu, rises abruptly to the height of 872 ft., forming a conspicuous landmark. The smaller islands clustered about this one are thickly covered with valuable wood, which is largely exported; but the isle of Pines, in spite of its name (which is said to have been given by Capt. Cook, who discovered the island in 1774 and cut spars here for his vessel), has a generally barren surface, with a broad belt of fertile land near the shore. The aboriginal inhabitants, of the same race as those in New Caledonia, were formerly cannibals; of late years they have become partially civilized. There are some European settlers, who cultivate the coast lands. In 1872 the French assembly selected the isle of Pines as a penal station for offenders condemned to imprisonment in a fortress. Several of the participants in the communal insurrection of 1871 are confined there.

PINE SNAKE (*pituophis melanoleucus*), a large serpent living in the pine lands from New Jersey southward. It attains a length of 6 ft. and a thickness of 2 in. The color is shining creamy white, with dark brown and chestnut blotches. Though large it is harmless, and it is perhaps the handsomest of the eastern snakes. It feeds on mammals, birds, and eggs; it emits a strong disagreeable odor. It is sometimes called bull snake, from its loud bellowing sound.

PINGRÉ, Alexandre Gui, a French astronomer, born in Paris, Sept. 4, 1711, died in 1796. He was educated at a convent school in Senlis, and became a teacher of theology; but having embraced Jansenistic opinions, he devoted himself to astronomy. He published from 1754 to 1757, under the name of *État du ciel*, a valuable nautical calendar; and after verifying La Caille's table of modern eclipses in the *Art de vérifier les dates*, he computed the similar phenomena that had occurred in the ten centuries preceding our era. From 1760 to 1776 he made scientific voyages to observe transits of stars, and to ascertain the value of Berthoud and Leroy's timepieces. In 1783 he published his *Cométographie, ou traité historique des comètes* (2 vols. 4to). He calculated the orbits of 24 comets. He translated the *Astronomica* of Manilius (1786).

PINGUICULA (Lat. *pinguis*, fat), a small genus of plants belonging to the bladderwort family (*lentibulaceæ*). They are stemless herbs with a cluster of broad radical leaves, from the centre of which rises a naked scape bearing a solitary drooping flower, with a two-lipped calyx and a spurred monopetalous corolla, which is somewhat two-lipped, the upper lips two- and the lower three-lobed; the plants are usually found in wet places, such as the margins of ponds and on wet rocks. There are five species in the United States, four of which are peculiar to the southern states, and one, *P. vulgaris*, rather rare on our northern borders, is found throughout the northern portions of the old world. This species has the common name of butterwort, from the greasy feel of the leaves, which also gives the botanical name; the flower stalk is 3 to 5 in. high, and the handsome flower bluish purple. The leaves have long been known to possess the power of coagulating milk in the same manner as rennet, and it is the custom of the Laplanders to pour reindeer's milk over the leaves for this purpose. The digestive power (so to speak) of the leaves has been examined by Darwin, whose investigations show that this must be added to the now considerable list of insectivorous plants. When an insect, meat, cartilage, or other animal matter is placed upon a leaf of the *pinguicula*, its margin curls over to embrace it, and the glands at the edge of the leaf pour out a slightly acid secretion which envelops the object and digests it. (See DIONÆA, and INSECTIVOROUS PLANTS.)



Butterwort (Pinguicula vulgaris).

PINK, the common name for species of *dianthus* (Gr. Διός, of Zeus, and ἄνθος, flower), many of which have long been in cultivation as garden flowers. One of the species, *D. caryophyllus*, has furnished the name, *caryophyllaceæ*, which botanists give to the pink family. The genus includes annual and perennial herbs, with opposite, narrow, often rigid, grass-like leaves; the flowers with their parts in fives; the long tubular calyx is five-toothed at the apex, and bracted at the base; the five petals have very long slender stalks, or claws, as they are technically called; stamens ten; styles two, the ovary ripening as a one-celled seed vessel, opening at the apex by four valves, and containing numerous seeds, which are flattish on the back. The species, of which there are properly about 70, though more than 200 are to be found in the books, mainly belong to the old world. North America can claim but one, *D. repens*, which is found on the N. W. coast at Kotzebue's sound and in other high latitudes, and is also a native of Siberia. The pinks are generally showy, but the two found

Sweet William (Dianthus barbatus).

growing wild in the Atlantic states are introduced annual weeds (*D. Armeria* and *D. prolifer*) and of very insignificant appearance. One of the most popular of the garden species of *dianthus*, *D. barbatus*, is rarely called pink, being better known by the name of sweet William, but is sometimes called bunch pink; it is the poet's pink of the French; it differs from most other species in forming a flat-topped cluster, crowded with variously colored small flowers, having sharply toothed petals; this is a native of Europe, and until within a few years has not held a very high rank, but great improvement has been made in the flowers; a strain called the auricula-flowered is very fine, from the distinct markings of the petals, and some of the double sorts are rich and remain in flower longer than the single. Though a perennial, this is usually treated as a biennial; the seed being sown in spring, the plants flower in the spring following, and as the first crop of bloom is finer than the later ones, it is better to throw out the plants after they have flowered, and provide for a succession by annual sowings. The common pink of country gardens, often seen in large tufts, is *D. plumarius*, a native of some parts of Europe and naturalized in many others; it is known as garden pink, plumed and pheasant's-eye pink, bunch, cushion, and grass pink, and by other botanical and common names; it is a low, hardy perennial, with small and very glaucous leaves, its flower stems produced early in summer, bearing one to three flowers, which in the single variety are of a pale pink color; their petals are fringed, and it has a strong and very pleasant fragrance; the improved varieties are double pink or double white, and some are marked with a dark eye, and they altogether present considerable variation; this is sometimes planted as an edging to beds, but its foliage is so dull that it produces an unpleasant effect if used in large quantities. Some regard this species as the parent of the finer kinds of florists' pinks, but it is very probable that other kinds were concerned in their production, though, as with many florists' flowers long in cultivation, it is difficult to trace them to their original species. The clove pink (*D. caryophyllus*), so called from the resemblance of its fragrance to that of the well known spice, is found wild in the south of Europe, and is no doubt the original of the finer kinds of pinks; it is perennial, and with its varieties scarcely hardy in our northern states; its stems become almost woody at the base; it has long, linear, and very glaucous leaves, and bears its flowers solitary at the ends of the branches; the scales at the base of the calyx are very short and broad, and the petals merely toothed; in the wild state the flowers are white and purple. This has long been a favorite flower, and cultivation has produced innumerable varieties; in a florist's classification the varieties are divided into picotees, pinks, and carnations, each including white, yellow, and every shade of red, up to dark crimson and scarlet, the distinctions being founded upon the arrangement of the colors. In the picotee the color making the variegation is only on the edge of the petals, in a broad or narrow band, and if any ramifies toward the centre of the flower it must be connected with that on the edge. Pinks, or florists' pinks, as they are often styled, have the color between the edge and the base of the petal, and in the whole flower it is in concentric circles, technically called the lacing of the flower. In carnations the color is in longitudinal splashes or stripes from the base of the petal to its edge; among carnations flowers showing two colors are called flakes, those in which there are three bizarres, and when there is but one color the variety is called self-colored. A class known as mule pinks, supposed to be a hybrid between the carnation and sweet William, contains some beautiful varieties which are

Florist's Pink.

Picotee Pink.

Carnation Pink.

China Pink (Dianthus Chinensis).

prized garden flowers. The Chinese pink (*D. Chinensis*) is a biennial, but as it flowers the first year from seed it is treated as an annual; it presents a great variety of colors in both single and double flowers, and while very showy is without fragrance. The pinks introduced within a few years as *D. Heddewigii*, *laciniatus*, and *diadematus*, are only varieties of the Chinese pink, some of them with very large flowers.—The perennial pinks may be raised from seed, the plants flowering the second year; but the established varieties are continued by layering or by cuttings, which are made from the leafy shoots at the base of the old plants. Great numbers of carnations are raised every winter for bouquets and floral decorations; the plants are started from cuttings in spring, and planted in the open ground, all the flower buds being removed as soon as they appear; in October they are potted, to be placed in the greenhouse, but where many are grown they are planted in earth upon the greenhouse benches; for winter blooming, self-colored flowers are preferred, especially pure white and bright carmine. During some winters carnations can be left in the open ground without injury, but it is safer for the amateur to keep them in a cold frame during winter.

PINKERTON, John, a Scottish author, born in Edinburgh in February, 1758, died in Paris, March 10, 1826. He was intended for the law, but settled in London in 1780 as a literary man. He published "Rimes" (1781); "Select Scottish Ballads" (2 vols. 8vo, 1783), many of the pieces being of his own composition; an "Essay on Medals" (2 vols., 1784); "Letters on Literature, by Robert Heron" (1785); "Ancient Scottish Poems" (2 vols., 1786), published from the manuscript collections of Sir Richard Maitland; "Dissertation on the Origin and Progress of the Scythians or Goths" (1787); and "Inquiry into the History of Scotland preceding the Reign of Malcolm III." (2 vols., 1789). His "History of Scotland from the Accession of the House of Stuart to that of Mary" (2 vols. 4to, 1797) is the most accurate history of the period. After the death of his patron Walpole he published "Walpoliana" (2 vols., 1799). Among his remaining works are the "Medallic History of England to the Revolution" (4to, 1790); "Iconographia Scotica" (4 parts 4to, 1794–'7); "Modern Geography digested on a New Plan" (2 vols. 4to, 1802); "Recollections of Paris in the Years 1802–'5" (2 vols., 1806); "General Collection of Voyages and Travels" (17 vols. 4to, 1808–'14), with maps and more than 200 engravings; and "Petralogy, or a Treatise on Rocks" (2 vols. 8vo, 1811). In addition to these he edited three volumes of scarce Scottish poems, Barbour's "Bruce," "Lives of Scottish Saints," &c. The last 22 years of his life were passed in Paris, where he died in indigent circumstances. His literary correspondence was edited by Dawson Turner (2 vols. 8vo, London, 1830).

PINKNEY. I. William, an American lawyer, born in Annapolis, Md., March 17, 1764, died Feb. 25, 1822. His family was a branch of the South Carolina Pinckneys, and early settled at Annapolis. He studied medicine in Baltimore, but devoted himself to law, and was called to the bar in 1786. In 1788 he was a delegate to the convention which ratified the constitution of the United States, and he subsequently held various state offices in the house of delegates, senate, and council. In 1796 he was sent to London as commissioner under the Jay treaty, remaining abroad till 1804. In 1805 he became attorney general for the state of Maryland. He was minister extraordinary to England in 1806, to treat with the British government in conjunction with Monroe, and was resident minister from 1807 to 1811, when he was appointed attorney general of the United States, which office he held over two years. He commanded a volunteer corps in the war of 1812, and was severely wounded at the battle of Bladensburg. In 1815 he was a member of congress, and in 1816 was appointed minister to Russia and special minister to Naples. In 1818 he returned home, and in 1819 was elected a United States senator. His "Life" was written by Henry Wheaton (New York, 1826). **II. Edward Coote,** an American poet, son of the preceding, born in London in October, 1802, died in Baltimore, April 11, 1828. He was educated at St. Mary's college, Baltimore, and at the age of 14 entered the navy as a midshipman. In 1824 he resigned his commission, was married, and commenced the practice of the law. In 1826 he was appointed a professor in the university of Maryland, and in 1827 assumed control of a political journal called "The Marylander," which from ill health he was soon obliged to relinquish. His poetical reputation rests on a volume entitled "Rodolph and other Poems," published anonymously in 1825. Some of the songs in this, including "The Health" and the "Picture Song," still have great popularity.

PINKROOT, an American ornamental and medicinal plant, known also in different localities as Indian pink, Carolina and Maryland pink and pinkroot, and worm grass. Its botanical name is *Spigelia Marilandica;* the genus (named in honor of Adrian van den Spigel or Spigelius, a botanist of the 17th century) belongs to the not very well limited order of *Loganiaceæ*. The plant is found from Pennsylvania and Wisconsin southward, being much more abundant in the southern states, though like other medicinal plants it is becoming rare everywhere. The root consists of very numerous yellow fibres; the simple erect, somewhat square stems, from 6 to 18 in. high, bear opposite, sessile, ovate-lanceolate leaves; the flowers, in a simple or forked one-sided spike at the top of the stem, are about an inch and a half long, tubular funnel-formed with five short lobes, of a deep red outside, and yellow within. This is one of the most brilliant of our native plants, and well deserving of cultivation; it seems to be impatient of removal, and requires some time to become well established; it endures the winter near New York. —The worm-destroying properties of pinkroot were known to the Cherokees, from whom the whites learned them, and it was long in use as a domestic remedy in the southern states before it became known to the medical profession; it was afterward made officinal in the pharmacopœias at home and abroad, and became an article of commerce. The root, consisting of numerous slender, branching, crooked, wrinkled fibres, attached to a knotty head or caudex, is used as an anthelmintic, especially against the *ascaris lumbricoides.* In large doses it is a somewhat uncertain cathartic, and in overdoses it gives rise to vertigo, dilated pupils, and facial and sometimes even general spasms. Some deaths have been attributed to its use; but these cases, if genuine, must have been in the highest degree exceptional, as the drug is most extensively used both in professional and domestic practice, not only without fatal but usually without unpleasant consequences. It is generally given in the form of an infusion or fluid extract with some cathartic, as senna. Its dose in substance is from 10 to 20 grains for a child three or four years old. The supposed active principle is acid and bitter, soluble in water and alcohol, uncrystallizable, and of neutral reaction. The dose of the fluid extract, an excellent form, is a teaspoonful for an adult, less for a child. *Spigelia anthelmia*, growing in the West Indies, is said to be even more efficient as an anthelmintic than our native species.

Pinkroot (Spigelia Marilandica).

PINNIGRADES, a division of carnivorous mammals, in which the legs are short, the feet being broad, webbed paddles for swimming, as in the seals.

PINTADO. See Guinea Fowl.

PINTO, Mendez. See Mendez Pinto.

PINTO DE FONSECA. See Chaves, Marquis of.

PINTURICCHIO, Bernardino (Bernardino Betti), an Italian painter, born in Perugia in 1454, died in Siena in 1513. He is generally said to have been a pupil of Perugino, though this is doubted by some on account of their nearly equal ages; they were at least intimately associated both in study and work. His earliest works appear to have been the decoration (with portraits, landscapes, and historical subjects) of the Belvedere at the Vatican and other palaces. From 1493 to 1496 he was employed by Pope Alexander VI. in similar paintings in the main portions of the Vatican; and later he painted one of his most important works, "The Discovery of the True Cross," in a chapel of the church of Ara Cœli. Perhaps the most famous of all his works are ten frescoes in the cathedral of Siena (painted 1502–'9), in all of which he is said to have been assisted by Raphael, but this is doubtful with regard to all but one or two. He painted portraits of celebrated contemporary personages, and several altarpieces.

PIN WORM (*oxyuris vermicularis*), a nematoid parasitic worm sometimes inhabiting the rectum of the human subject, especially in young children. This worm is white and filamentous; the male one eighth of an inch long, the female rather less than half an inch. They frequently accumulate in the rectum in considerable numbers, some being always visible in the evacuations. Under these circumstances they are apt to produce a great amount of distressing irritation in the anus and its neighborhood, especially at night after the patient has retired to rest, when they make their way out through the anus and cause a pricking, burning, and itching sensation in the delicate mucous membrane, which is sometimes almost intolerable. The disease is usually temporary, being confined as a general rule to infancy and early childhood, and disappearing spontaneously after a time. During this period, however, it may cause great discomfort, and when exaggerated in intensity may even induce serious disturbance of the health. The parasites are troublesome principally by their numbers, and the proper treatment accordingly is to evacuate them from time to time by the administration of anthelmintic remedies, or, what is better, by the habitual use of enemata, consisting of soap and water, or salt and water, repeated every two or three days until the symptoms are relieved.

PINZON, the name of a family of wealthy and daring navigators, of the port of Palos de Moguer in Andalusia, three members of which were intimately associated with Columbus in his discovery of America. **I. Martin Alonso,** the head of the family at that time, offered to afford the means for Columbus to renew his application to the court. When the latter had obtained the royal order to fit out three vessels for the voyage, it was principally through the influence of the Pinzons that crews could be collected for them. Martin Alonso commanded the Pinta on this voyage. In the subsequent cruising in search of the imaginary island of Babeque, he deserted Columbus in the latter part of November, 1492, and went in search of it himself. He stopped at a river in Hispaniola (Hayti), now called Porto Caballo, but which for a long time was designated as the river of Martin Alonso. From here he carried off four men and two girls with the intention of selling them in Spain as slaves, but was afterward forced to restore them to their home by Columbus, with whom he fell in during the following January, attributing his parting company with the admiral to stress of weather. On the return voyage they were again separated by a storm, and Pinzon was driven into the port of Bayonne. Not doubting that Columbus had perished in the tempest, he wrote to the sovereigns, giving information of the discovery, and asking permission to come to court and deliver his account in person. He arrived in Palos on the evening of the same day with the admiral, and found that the latter had had a triumphant reception. He landed in private, and received not long after a letter from his sovereign forbidding him to appear at court. Soon after he died. **II. Vicente Yañez**, who had commanded the Niña in the first expedition of Columbus, in consequence of the general license given by the Spanish sovereigns to make voyages of discovery, fitted out an armament of four caravels, manned principally by his friends and relatives, and on Nov. 13, 1499, sailed S. W. from Palos. After going about 700 leagues, he crossed the equinoctial line and lost sight of the north star. On Jan. 28, 1500, land was descried; it was Cape St. Augustine. Pinzon was thus the first European to cross the equator in the western ocean, and the first discoverer of Brazil. He took formal possession of the country for the Castilian crown; but being resolutely met by warlike natives, he sailed N. W., and reached the mouth of the Amazon. Pursuing his course, he passed the mouth of the Orinoco, and in the latter part of June reached Hispaniola. In July two of the caravels were sunk with their crews in a terrific hurricane. Pinzon arrived in Palos about the end of September, after a disastrous voyage, which had swallowed up all his fortune. On Sept. 5, 1501, royal permission was given him to colonize and govern all the country he had discovered from Cape St. Augustine to a little north of the Amazon, but he never availed himself of the grant. In 1506, and again in 1508, he started jointly with Juan Diaz de Solis on voyages to discover a passage from the Atlantic to a southern ocean, discovering Yucatan in the former voyage, and advancing as far as the 40th degree of S. latitude in the latter. **III. Francisco Martin**, the third brother, accompanied the first expedition of Columbus, as pilot of Martin Alonso's vessel, the Pinta.—Charles V. raised the Pinzon family to the rank of hidalgos.

PIOMBINO, a town of Italy, in Tuscany, province of Pisa, separated by the strait of Piombino from the island of Elba; pop. about 3,000. It is situated on a peninsula which shelters the small harbor of Porto Vecchio, and is fortified. It was formerly the capital of the principality of Piombino (area, 130 sq. m., pop. about 25,000), which was originally a fief of the emperors of Germany, who at the end of the 14th century gave it to the Appiani family, and in 1631 to Spain. In 1634 it reverted to the Ludovisi family, and in 1681, by marriage of the heiress, to the Buoncompagni family. Ferdinand IV., king of the Two Sicilies, who had become suzerain of the principality, ceded it in 1801 to Napoleon, who gave it to his sister Élisa, princess of Lucca and Piombino. The Buoncompagni-Ludovisi family was reinstated in 1815, under the suzerainty of the grand duke of Tuscany; and in 1860 it was incorporated with the dominions of Victor Emanuel.

PIOMBO, Fra Sebastiano del, an Italian painter, whose family name was Luciano, born in Venice in 1485, died in Rome in 1547. He studied under Giovanni Bellini and Giorgione, and visited Rome, where Michel Angelo gave him valuable advice, and set him up as a competitor of Raphael. His "Raising of Lazarus," which is said to include several groups and figures invented, if not designed, by Michel Angelo, was at all events intended to rival the "Transfiguration" of Raphael. He excelled most in portraiture. Clement VII. appointed him keeper of the papal seals, from which he was called Piombo (lead), the substance used in sealing bulls. His office obliged him to assume the monk's habit, whence he was styled Frate or Fra. He is said to have originated painting upon walls with oil colors, having invented a composition which prevented the colors from becoming dark.

PIORRY, Pierre Adolphe, a French physician, born in Poitiers, Dec. 31, 1794. He took his degree in 1816, after serving as surgeon in the French army in Spain, became a physician to hospitals in Paris in 1827, and clinical professor at the faculty in 1840, at the Charité in 1846, and at the Hôtel-Dieu in 1864; and in 1866 he retired with a pension. His *Traité sur la percussion médiate* won the Montyon prize in 1828. This work explains his invention of a new mode of percussion with a plate of ivory or metal, from which he anticipated great improvements in medical practice; but his theories found numerous and influential opponents. His other principal works are: *De l'hérédité dans les maladies* (1840); *Traité de médecine pratique et de pathologie iatrique ou médicale* (9 vols., 1841-'51); *Mémoire sur la curabilité et le traitement de la pthisie pulmonaire* (1860); *La médecine du bon sens* (1864; 2d ed., 1867); and *Traité de plessimétrisme et d'organographisme* (1866).

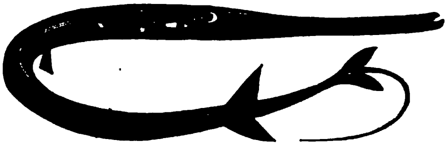
PIOTRKÓW. **I.** A government of Russia, in Poland, bordering on Kalisz, Warsaw, Radom, Kielce, and Prussian Silesia, and drained by the Pilica and Warta; area, 4,730 sq. m.; pop. in 1872, 696,007. The surface is level except in the south, where it is hilly, and the soil mostly sandy. It contains the manufacturing towns of Lodz, Zgierz, and Tomaszów. **II.** A town, capital of the government, 80 m. S. W. of Warsaw, with which it is connected by rail; pop. in 1867, 13,633, a considerable portion of whom were Jews. It is one of the oldest Polish towns. It contains a fine town hall, a number of Roman Catholic churches, a free Lutheran church, a synagogue, and a gymnasium and other schools. Diets were held here in the 15th and 16th centuries, and the supreme tribunal of Great Poland first sat here in 1578.

PIOZZI, Hester Lynch, an English authoress, born at Bodvel, Carnarvonshire, Jan. 16, 1740, died in Clifton, near Bristol, May 2, 1821. She was the daughter of John Salusbury, esq., and in 1763 married a wealthy brewer named Thrale. Shortly afterward she formed the acquaintance of Dr. Johnson, who was an inmate of her family from 1766 to 1781, when Mr. Thrale died. In 1784, much against Dr. Johnson's wish, she married an Italian music master named Gabriel Piozzi. She survived her second husband, and in the latter part of her life became attached to the actor William A. Conway, her "Love Letters" to whom were published in 1843. After Johnson's death she published "Anecdotes of Dr. Samuel Johnson during the last Twenty Years of his Life" (8vo, 1786), which produced a feud between her and Boswell and the other friends of Johnson. Her other works are: "Letters to and from Dr. Samuel Johnson" (2 vols. 8vo, 1788); "Observations and Reflections made in the course of a Journey through France, Italy, and Germany" (2 vols. 8vo, 1789); "British Synonymy, or an Attempt at regulating the Choice of Words in Familiar Conversation" (2 vols. 8vo, 1794); and "Retrospection, or a Review of the most striking and important Events, Characters, Situations, and their Consequences, which the last Eighteen Hundred Years have presented to the view of Mankind" (2 vols. 4to, 1801). The poems contributed in 1765 to the "Miscellanies" published by Anna Maria Williams, especially "The Three Warnings," are considered her best productions.—See "Autobiography, Letters, and Literary Remains of Mrs. Piozzi," edited, with notes and a memoir, by A. Hayward (2 vols. 8vo, 1861).

PIPE, Tobacco, a bowl and connecting tube made of baked clay, stone, wood, or other material, and used in smoking tobacco. Clay pipes, with slender stems of six inches to a foot or more in length, have been largely supplied to commerce from potteries devoted to this manufacture in England, the clay, which is a peculiarly white and adhesive variety, being obtained at Purbeck in Dorsetshire, and at Newton Abbot in Devonshire. They are also largely manufactured in Holland, and of a finer quality in France. The manner of making a clay pipe is briefly as follows. The clay being worked and tempered by the proper admixture of water, a child rolls from a ball a slender cylinder with his hands and a spatula, for the stem; a small lump is attached to one end of this for the bowl. The whole is then placed in a folding iron or brass mould, and a wire is laid in the centre of the stem. A plug forms the hollow of the bowl. After being subjected to pressure and allowed to remain long enough to set, the moulded pipe is removed, dressed, and baked in a kiln, which is usually of a capacity to fire about 50 gross in from 8 to 12 hours.—On the American continent pipes have been in use from very remote periods. They are found in the ancient mounds of the west, elaborately carved in stone into fanciful shapes, often resembling various animals of the country. In northern New York and in Cayuga co. they are frequently discovered in ploughing. Some are of soapstone and others of baked clay. On the summit of the dividing ridge between the St. Peter's and the Missouri rivers, called the Coteau des Prairies, and in the latitude of St. Anthony's falls, the Indians have long procured a peculiar variety of red steatite or soapstone, of which all the red stone pipes of that region are made. Catlin was shown the spot at the base of a long vertical wall of quartz, which lay in horizontal strata, the pipestone layers spreading under the adjoining prairie land of the ridge, whence it was obtained by digging a few feet in depth. He judged from the great extent of the excavations, and from the graves and ancient fortifications, that the place must have been frequented by different tribes of Indians for many centuries. The pipes made of this stone are heavy, and usually rather plain, decorated by bands and ornaments of lead, which appear to have been run into depressions and then smoothed down. The stems are long and curiously carved sticks of hard wood, sometimes flat, frequently ornamented with gayly-colored feathers of birds and horse hair dyed scarlet.—The most elaborate pipes are those of the Asiatics, especially the Persians and Turks. (See MEERSCHAUM.) The bowls are large and heavy, not intended to be held in the hand or carried about, and the stems are several feet long, sometimes made in part of spiral wire covered with a thin impervious coating of leather or other substance, so that this portion is very flexible. The mouthpiece is of ivory, silver, or amber, the last being preferred and much the most expensive. The principal portion of the amber product of Prussia is applied to this use, and some of the mouthpieces command very large prices. The eastern *hookah* is a pipe of extraordinary size, and an instrument of such importance in the courts of the princes that a special officer is appointed to take care of it, and present the mouthpiece to his master for smoking. The large bowl of this pipe is set upon an air-tight vessel containing water, and a small tube from the pipe passes down into the water. The smoking tube is inserted into the side of this vessel, and communicates through a long flexible tube with the mouthpiece. By exhausting the air through this the smoke is forced down under the water, and entering the space above it passes into the stem, freed by its contact with the water from some of the most acrid properties of the tobacco.—The German pipes are of great variety, as well of material as of form. Those of porcelain are sometimes beautifully painted in the style of fine chinaware painting. Iron tobacco pipes are used in Thibet and Mongolia. Pipes are now very extensively carved from the roots of briers (called brierwood pipes) and other roots, and cheaper ones from various kinds of wood. The stem is of cherry, horn, or other material, connected with the bowl by a perforated piece of cork.

PIPE FISH, the popular name of the subfamily *syngnathinæ* of the lophobranchiate order of marine acanthopterygian fishes, and particularly of the genus *syngnathus* (Linn.). The characters of the order have been given in the article LOPHOBRANCHS. In the subfamily the form is much elongated, and covered with a series of imbricated plates, and the gills are arranged in tufts instead of plates. The genus has a seven-sided body, the snout straight and cylindrical, and without spines; a single dorsal on the middle of the back, not on an elevated plane, the upper border of the back never in the same line with that of the tail; the upper border of the latter either continuous with the lateral line or interrupted where that ends; dorsal surface flat or slightly concave, and the rings of the body 24 to 27; the gill opening is circular and high up, and the ventrals are wanting; the jaws tubular, the mouth at the end; in some species the pectorals, anal, and caudal are wanting; the tail is not prehensile; the head in the same line with the body; the males have a caudal egg pouch under the tail, open in its whole extent. About 20 species are described, of which in Europe the best known is the great pipe fish (*S. acus*, Linn.), sometimes called needle fish; this has all the fins except the ventrals; it is found at high or low water, swimming slowly among sea weeds, feeding on small crustaceans and mollusks, marine worms, insects, and roe of fishes. In the male the posterior part of the abdomen is broader than the rest, with two soft flaps folding together and forming a kind of pouch for the reception of the eggs, which, it is believed, are placed there by the female; it is greatly attached to the young, which also, when small, are said to take refuge in the pouch; it is interesting to observe that whenever among fishes unusual care is taken of the eggs or young, this duty is performed by the males. It attains an average length of 18 in., and is pale brown, transversely barred with darker brown; the tail is fan-shaped. In America is the *S. Peckianus* (Storer), which attains a length of 12 in.; the color is olive brown, with numerous transverse darker bars, and yellowish below; pouch present, and all the fins except the anal, or the latter is exceedingly minute; eyes prominent and very movable. Another species, from New England and New York, less common, is the brown pipe fish (*S. fuscus*, Storer), of a general brownish color. It is very easy to see in the aquarium that the tail is not the sole nor the principal organ of locomotion in these fishes, and many species have no fin but the dorsal; when desirous of rapid progress, they move the body very much like an eel, but in ordinary locomotion the dorsal is the chief motor organ; this may be seen to make short and quick vibratory movements which pass in spiral waves along its border, like the screw of a propeller, and might well have suggested this motive power to naval architects. They have also a remarkable power of moving the eyes, even through an arc of 90°, and each independently of the other; this faculty is possessed by the family.—Other acanthopterous species of the family *aulostomidæ* are also called pipe fishes; these are characterized by the prolongation of the bones of the face into a long tube, at the end of which is the mouth; the ribs are short or absent, and the intestines have neither great dilatations nor many folds. In *fistularia* (Linn.) the mouth is small, with a nearly horizontal gape; the body long and slender, the head forming one half or one third of the total length; branchiostegal rays six or seven; dorsal single and simple, opposite the anal; teeth small; one or two jointed filaments, sometimes as long as the body, issuing from between the deep forks of the caudal; air bladder very small; scales invisible. The serrated pipe fish (*F. serrata*, Bloch) attains a length of 28 to 30 in., of which the caudal filament is 10 or 12 in.; color light drab, with a narrow brownish blue band along the sides, the throat white, and the abdomen and irides silvery; the snout with longitudinal serrated ridges; the lower jaw the longer and somewhat curved upward, with a fleshy protuberance at the chin; the shoulders covered with horny plates; the dorsal and anal triangular, pectorals quadrangular, ventrals very small and about midway between

Pipe Fish (Syngnathus Peckianus).



Serrated Pipe Fish (Fistularia serrata).

pectorals and anal; it is found from Massachusetts to the coast of Brazil. The tobacco-pipe fish (*F. tabacaria*, Bloch), also American, is smaller, brownish with a row of pale spots, with the abdomen white in the middle, and the orbits spiny. In *centriscus* (Linn.) there is the tubular snout, but the body is oval and compressed, trenchant on the abdomen; there is a spinous dorsal very far back, with a strong first spine, and a soft dorsal behind it; the body is covered with small scales. The *C. scolopax* (Linn.), called sea snipe and trumpet fish, is common in the Mediterranean; it is 4 or 5 in. long, reddish on the back and sides, and silvery on the belly, sometimes with a golden tinge; its flesh is delicate and esteemed. The food of all these fishes consists of minute crustaceans and other marine animals.

PIPESTONE, a S. W. county of Minnesota, drained by tributaries of the Big Sioux and Minnesota rivers; area, 432 sq. m.. The population was not returned in the census of 1870. The surface consists of rolling prairies.

PIPPI. See Giulio Romano.

PIPSISSEWA. See Chimaphila.

PIQUA, a city of Miami co., Ohio, on the W. bank of the Great Miami river, here crossed by three bridges, and on the Miami canal and the Cincinnati, Hamilton, and Dayton, and the Pittsburgh, Cincinnati, and St. Louis railroads, 73 m. W. by N. of Columbus, and 88 m. N. by E. of Cincinnati; pop. in 1850, 3,277; in 1860, 4,616; in 1870, 5,967; in 1875, about 8,000. The river here makes a bend, leaving a level plateau between the city and the water's edge, while on the opposite side the bank rises boldly. The city is regularly laid out with wide streets. Holly water works are in course of construction. A large business is carried on with the surrounding country, which is rich in agricultural products. Water power is supplied by the canal, and considerable manufacturing is carried on, the principal establishments being car shops, agricultural works, woollen mills, founderies, &c. There are two national banks, with a joint capital of $300,000; graded public schools, including a high school; three weekly newspapers, and 14 churches.

PIQUET, a game played by two persons with 32 cards, eight of each suit, from ace to seven inclusive. The cards rank as in whist. He who cuts the lowest piquet card deals, after his adversary has cut, two by two, until each party has 12 cards. The remaining eight are "the stock," which are placed in one pile between the players. The elder hand then makes his discard. He must discard at least one, and may discard five, replacing the number discarded from the stock. Until the elder hand has replaced the number of his discarded cards from the stock, the younger hand must not touch any of the stock cards. He may then discard from his own hand as many as there remain of the stock, and take all of the stock cards left. But this is optional; he need not take any, or may take a part only. If the elder hand takes from the stock fewer than five cards, he may look at those which he leaves, but he cannot look at the three cards of the stock reserved for the younger hand. Should the dealer leave any cards in the stock, he has a right to look at them; and if he does so, the elder hand may look at them also after he has played; but if the dealer does not look at them, neither may the elder hand do so. The score is composed of the point, the sequence, the quatorze, the cards, and the capot. 1. The point counts first. Before playing, the elder hand announces the greatest number of cards of the same suit in his hand as his point, and counts as many as he has cards, one for each. But if the younger hand has a greater number of cards of one suit, the point counts for him. If each player has an equal number, then the value of the cards is ascertained, viz.: ace, 11; king, queen, knave, and ten, each 10; and the remainder according to their pips; and the point is counted in favor of the hand of greatest value; or if both are of equal value, the point is "paid" and counts for neither. 2. The sequence consists of at least three cards of the same suit, following consecutively, as ace, king, queen, or seven, eight, nine, &c. There are six sequences: a tierce or sequence of three, counting 3; a quart, counting 4; a quint, counting 15; a seizième, counting 16; a septième, counting 17; a huitième, or the whole suit, counting 18. The player holding the highest sequence counts it, and all other sequences in his hand, to the exclusion of all sequences held by his adversary. If the highest sequence in one hand is of the same value as that held by the adversary, no sequences held by either can be counted, but one sequence is valued, as against another, according to the rank of the cards of which it is composed, one composed of king, queen, and knave being superior to another composed of queen, knave, ten, &c. 3. The quatorze is the holding of four aces, kings, queens, knaves, or tens. Whichever player holds the highest quatorze counts 14, to the exclusion of another or others held by his opponent. If neither party has a quatorze, then three of equal value, aces, kings, queens, knaves, or tens, are counted by the holder for 3. The party having the superior quatorze or threes counts all inferior ones, to the exclusion of all held by the adversary. 4. Two cards, one from each player, form the trick. Each lead, whether the trick be taken or not, counts one, and each trick taken counts one; but if the party leading takes the trick, he counts one only for both. If each party has six tricks, they are "divided;" but the winner of seven or more tricks adds 10 to his score. The last trick counts 2 for the winner. 5. The capot is won by taking all the 12 tricks, and instead of 10 gives 40 to the winner.—After the hands are completed, and before playing, the elder hand claims the point, sequence, quatorze, or threes, according to the strength of his hand, and his claims are allowed, or disallowed as "not good," or are "paid" when a claim of equal value is made by the dealer. He then plays his first card, and the dealer or younger hand must then, before playing, make his claims. If, on the strength of his hand, the elder hand can count to 30 without playing, instead of calling "thirty," he calls "ninety;" or if from strength of hand and by taking tricks he can reach 30 before the adversary takes a trick, he may call "sixty;" but in neither case can he do this if the dealer has, on the strength of his hand, made a count. In like manner the dealer, while he cannot gain a pique, that is, count from 29 to 60, yet if he can, without playing and before the elder hand has made a score on the strength of his hand, count 30 on his hand alone, he wins a repique, which also adds 90 to his score. Whichever party gains the point must lay it upon the table. If he does not do so, or if he omits to claim any other point before playing, he loses the count. All other claims as to value of cards are, if admitted, followed by showing the point claimed. A party making a claim to what he has not got counts nothing that hand. A party playing with more than 12 cards cannot score anything; playing with fewer than 12 is without penalty. In calling points, sequences, &c., make your highest claim first, that is, quatorze rather than threes, if you have both; because if your first claim is "paid," or beaten, you cannot then claim the higher point. A card touching the board is played, unless it causes a revoke. A party dealing twice, and discovering it before seeing his own cards, may insist upon a deal by his adversary. A card once discarded cannot be taken back. The game is ordinarily played for 100 points. Sometimes the "Rubicon" game of six hands is played, in which if one party scores less than 100, his score is added to that of the winner, if he has scored 100 or more.

PIRACY, robbery upon the sea. Spelman says that *pirata* once meant in England sea knight or soldier; and he cites an instrument of the time of King Edgar, in which one of the witnesses styles himself *archipirata*, that is, as Spelman translates it, admiral. He also quotes Asser and another ancient chronicler, who write that the war galleys of Alfred and of William the Conqueror were manned by *piratæ*. The legal definitions of pirate and piracy are derived from the civil law, whence they were transferred to the maritime and admiralty laws and the law of nations The civil law applied *piratæ*, *prædones*, and *latrones* to the same kind of offenders; indeed, the latter terms were sometimes used interchangeably with the former. But the proper, and in fact the sole difference between the terms, was that *prædones* and *latrones* described robbers upon land, while *piratæ* meant robbers on the sea. The writers upon the civil, the international, and maritime codes agree in defining piracy as robbery or depredation on the sea. Strictly speaking, piracy is not an offence known to the common law. As it is a crime committed on the high seas, it is committed out of its jurisdiction. Until the statute 28 Henry VIII. it was exclusively a civil law offence, cognizable only by the admiralty courts. But the procedure under the forms and rules of the civil law includes no trial by jury, and it was plainly an encroachment on the liberties of the English subject that his life should be forfeited without judgment by his peers, according to the law of the land. Furthermore, as the statute itself recites, there could be under the civil law no conviction for a crime unless the accused plainly confessed it, or it were directly proved by witnesses who saw it committed. The statute therefore enacted that the offences which it contemplates should be judged in such shires and places as should be designated by the king's commission, and in the same form as if the alleged crime had been committed upon the land. This commission is directed to the admiral or his deputy, and to three or four others, among whom, says Blackstone, are usually two common law judges. The indictment is found and tried by grand and petit jury, and the trial follows, in other respects, the course of the common law. Yet it is to be observed that the court thus constituted is still essentially an admiralty court. The statute, said Chief Justice Mansfield, merely altered the mode of trial, but the jurisdiction of the court rests on the same foundation as before the act; it is regulated by the civil law, and by maritime customs, grounded on the law of nations. Piracy, therefore, can be said to be an offence at common law only when this term is taken in its most comprehensive sense, and so inclusive of the law of nations.—In the United States, the cognizance of piracy is reserved by the constitution to the general government. The eighth section of the first article of that instrument gives to congress the power "to define and punish piracies and felonies committed on the high seas, and offences against the law of nations." Under this constitutional provision, and because the United States courts have no common law jurisdiction, the definition of piracy in our law is to be sought exclusively in the acts of congress, and it will be seen that they have materially enlarged the usual conception of the offence. The act of April 30, 1790, declared that murder or robbery committed on the high seas, or in any river, haven, or bay out of the jurisdiction of any particular state, or any other offence which, if committed within the body of a county, would by the laws of the United States be punishable with death, should be adjudged to be piracy; and if any captain or mariner should piratically and feloniously run away with any vessel, or any goods of the value of $50, or yield up any such vessel voluntarily to pirates, or if any seaman should by force attempt to hinder his commander from defending the ship or goods committed to his trust, every such offender should be adjudged a pirate and a felon, and be punishable with death. The words high seas here apply to any waters near seacoasts which are beyond low-water mark. A temporary act in 1819, revived and continued in 1823, authorizes public and private ships to seize pirates wherever they may be found. The act of May 15, 1820, provides: "If any person shall upon the high seas, or in any open roadstead, or in any haven, basin, or bay, or in any river where the sea ebbs and flows, commit the crime of robbery in or upon any ship or vessel, or upon the lading thereof, or upon the crew, he shall be adjudged a pirate. . . . . If any person engaged in any piratical enterprise, or belonging to the crew of any piratical vessel, shall land and commit robbery on shore, such person shall also be adjudged a pirate, and upon conviction shall suffer death." The act of March 3, 1847, provides that subjects or citizens of foreign states found and taken on the seas making war on the United States, or cruising against the vessels and property thereof, or of the citizens of the same, contrary to the provisions of any treaty existing between the United States and the country of such persons, shall, when such acts are declared by such treaties to be piracy, be arraigned, tried, convicted, and punished in the courts of the United States. Finally, citizens of the United States who are engaged in the slave trade are declared by the statute of 1820 to be pirates, and upon conviction are to suffer death. These are the existing laws concerning piracy. The general rule, that robbery on the high seas is piracy, has no exception or qualification in favor of commissioned privateers in any act of congress, or in the law of nations; and accordingly a privateer bearing a commission of the United States, who feloniously seized the goods of a neutral, that is to say, robbed him on the high seas, was adjudged a pirate. A recent act (Aug. 5, 1861) makes vessels built, purchased, fitted out, or held for piratical acts subject to seizure and condemnation, whether any act of piracy has been committed or attempted from such vessel or not.

PIRÆUS (Gr. Πειραιεύς), a town of Greece, the seaport of Athens, on a peninsula of the same name and on the shore of the harbor formed by a small inlet of the Saronic gulf, 5 m. W. S. W. of the city, with which it has been connected by rail since 1869; pop. in 1872, 11,047. Of the three ports anciently employed by the Athenians (Piræus, Munychia, and Phalerum), Piræus is the only one which has always remained in use, and is fit for the service of a modern harbor, the others being too shallow. The modern town has sprung up entirely since 1834, and is growing rapidly. It contains four churches, six schools, a custom house, and a lazaretto. The harbor of Piræus is deep and safe, though the entrance is somewhat difficult. The number of vessels entering the port in 1872 was 713, with an aggregate tonnage of 71,402. The imports in that year were valued at $3,177,334, the exports at $681,956. The railway connecting it with the city was the first constructed in Greece.—Before the Persian war Phalerum had been the port of Athens; but Themistocles, seeing the natural advantages of the Piræus, surrounded the peninsula with a line of fortifications 60 stadia in circumference and 60 ft. high. It was afterward, for greater security, connected with Athens by the celebrated long walls. Sulla destroyed its fortifications and arsenals, and it never recovered from the blow. Piræus had become even in the time of Strabo an insignificant village. During the middle ages the harbor was called Drako or Porto Leone; the latter name coming, according to some authorities, from two brazen lions which long ornamented the entrance to the port, but were carried away by the Venetians in 1687; according to others, from a white marble lion formerly placed upon the beach below the port. The adjacent harbors of ancient Munychia and Zea bore at the same period the names Phanari and Stratiotiki, and all these names were perhaps more commonly used than the ancient ones down to the end of the Turkish rule. (See ATHENS, vol. ii., pp. 58, 59.)

PIRANESI, Giovanni Battista, an Italian engraver, born Oct. 4, 1720, died in Rome, Nov. 9, 1778. He completed his studies in Rome, where he resided for many years. He has been called "the Rembrandt of architecture" on account of his skill in designing and engraving architectural subjects and ancient ruins. Piranesi drew at once on the plate, and finished it by etching, hardly using the graver. For spirit and vigor of execution and bold effect his works are unique. The most celebrated of them relate to the antiquities, public buildings, and views of Rome. His son Francesco published in Paris a complete collection of his plates, comprising nearly 2,000 subjects, in 30 vols. fol. The most recent edition is in 29 vols. fol. (1836). Both Francesco and his sister Laura inherited to some extent their father's genius.

PIRMASENS, a town of Rhenish Bavaria, 12 m. E. S. E. of Zweibrücken; pop. in 1871, 8,563. It has a Protestant church, with a fine monument of the landgrave Louis IX. of Hesse-Darmstadt. Shoes are the most important of the many articles manufactured here, and are exported to the United States and other countries. The Prussians here defeated the French under Moreau, Sept. 14, 1793.

PIRNA, a town of Saxony, on the left bank of the Elbe, 10 m. S. E. of Dresden; pop. in 1871, 8,905. It has a celebrated lunatic asylum. The town was of importance during the middle ages, but its commerce and industry declined under successive wars until a recent period, when they revived, and an active trade is now carried on in many articles, especially in the so-called Pirna sandstone.

PIRON, Alexis, a French dramatist, born in Dijon, July 9, 1689, died in Paris, Jan. 21, 1773. He took his degree as an advocate at

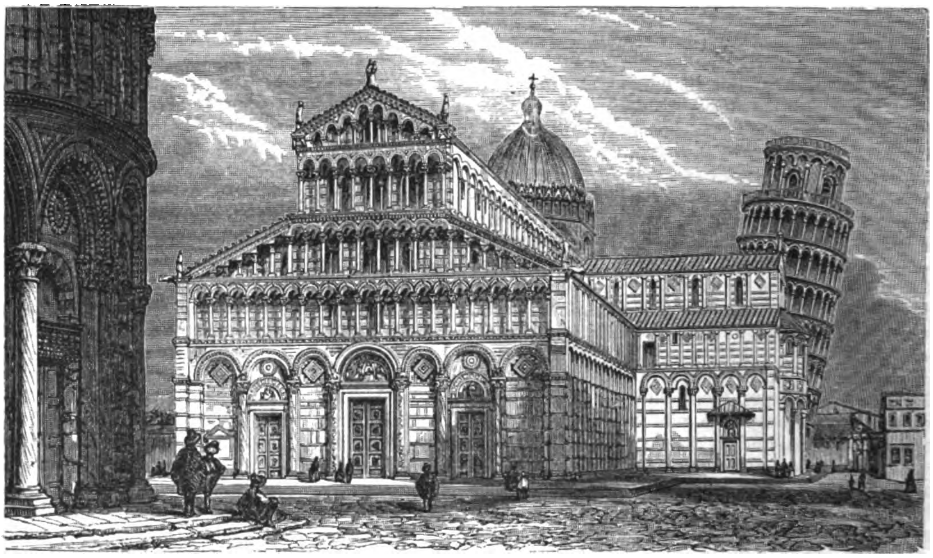
Besançon, but had not the means to sustain himself in that profession. A licentious ode, which he composed in his 20th year, made him famous. In 1719 he went to Paris, where he led a precarious existence, first as a secretary of Belle-Isle, Fouquet's grandson, and next as a playwright. His reputation as a dramatist was firmly established in 1738 by his masterpiece *La métromanie*, an admirable comedy. But few of his tragedies were successful, though Piron regarded himself as equal to Voltaire, who never missed an opportunity to chastise his presumption. Piron was regarded as one of the brilliant wits of his day; and he was one of the founders of the celebrated convivial society, *le caveau*. In 1753 he was elected to the academy, but the king refused his assent on account of the objectionable ode of his younger days, whereupon he suggested as his epitaph:

Ci-gît Piron, qui ne fut rien,
Pas même académicien.

The king, however, gave him a pension of 1,000 livres. Rigoley de Juvigny published his works with a biography (7 vols., 1776); and in 1859 appeared his *Œuvres inédites*, by Honoré Bonhomme.—His wife, Marie Thérèse Quenaudon, known also as Mlle. de Bar (1688–1751), was almost as witty and accomplished as her husband, but she became insane in 1745.

PISA, an ancient town in the Peloponnesus, capital of Pisatis or the middle district of Elis, situated in the lower valley of the Alpheus, between Harpina and Olympia, and near the latter place. In mythology it was known as the home of Œnomaus and Pelops. Subsequently it became the head of a confederacy of eight states, and had the presidency of the Olympic festival, of which it was deprived by the neighboring Eleans, but recovered it in the 34th Olympiad, 644 B. C. This privilege became a continual cause of war between Pisa and Elis, until in the 52d Olympiad (572 B. C.) the Eleans were finally successful, and Pisa was so completely destroyed that in the time of Strabo its very existence was disputed.

PISA. I. A province of Italy, in Tuscany, bordering on Leghorn, Lucca, Florence, Siena, Grosseto, and the Mediterranean; area, 1,180 sq. m.; pop. in 1872, 265,959. The principal river is the Arno. The surface presents great variations, consisting of fertile plains, swamps, hills, and mountains. The principal products are grain, oil, wine, fruit, timber, silk, hemp, and flax. It is divided into the districts of Pisa and Volterra. II. A city, capital of the province, on the Arno, 7 m. from its mouth, 12 m. N. N. E. of Leghorn, and 42 m. W. of Florence; pop. in 1872, 50,341. It is built on a plain, enclosed on the east by the Apennines, and open on the west to that part of the Mediterranean known as the Tuscan sea. The city is surrounded by an ancient wall with five gates, and is protected by a citadel. The Arno is spanned by several bridges, the ponte del Mezzo, of white marble, with three arches, being one of the finest in Europe. The cathedral, baptistery, leaning tower, and Campo Santo of Pisa are four of the most remarkable structures in the world; they are all built of white marble and in corresponding style. The cathedral, finished early in the 12th century, contains some celebrated works of art. It was greatly damaged by fire in 1569. The baptistery, finished later than the cathedral, is a cir-



The Cathedral, Leaning Tower, and Baptistery, Pisa.

cular edifice 160 ft. in diameter and 179 ft. high, with mosaic pavement and carved columns. The celebrated leaning tower or campanile is 179 ft. high and 50 ft. in diameter, and divided into eight stories, each having an outside gallery projecting 7 ft. (See CAMPANILE.) The Campo Santo (see CEMETERY) became the model of other cemeteries in Italy, and contains frescoes which developed the genius of Raphael and Michel Angelo. The university, one of the most famous in the middle ages, and attended in 1875 by about 500 students, has a library of nearly 60,000 volumes. There is an academy of fine arts, a museum of natural history, and a botanic garden. The Uppezinghi, Lanfranchi, and Pesciolini palaces are imposing buildings. The aqueduct connecting with the valle d'Asciano, built in the 17th century, is 4 m. long, and has 1,000 arches and 8 reservoirs. Oil and marble are exported, but the commercial and industrial activity is limited.—Pisa is of remote and contested origin. The Etruscans had early settlements here. In the 2d century B. C. it became a Roman colony and a fashionable resort. In the 9th century A. D. it had fully recovered from the vicissitudes which had overtaken it after the fall of the Roman empire, and became a free town and one of the most powerful maritime republics of the middle ages. Its glory reached a climax in the 11th century by the conquest of Sardinia, Corsica, Elba, and afterward of the Balearic islands and other territories, and by repeated victories over the Saracens, whose fleet was destroyed by the Pisans at Palermo, which city they captured (1063). But the warfare with the rival republic of Genoa began about the same period, and became the source of great disasters. Nevertheless the Pisans extended their trade in the Levant, where by joining in the crusades they had obtained great privileges, which they retained for a considerable period. But their devotion to the Ghibellines resulted in a league of the Guelphic cities against Pisa. In 1284, owing to the pernicious influence of Ugolino della Gherardesca (see GHERARDESCA), they were overwhelmed by the Genoese in the naval battle of Meloria, and before the close of the century they had lost Corsica and most other possessions. Under Uguccione, early in the 14th century, there was a momentary revival of national prosperity; but a downward course began shortly after, owing to party strifes and the intervention of the emperor Charles IV. In 1392 they fell under the sway of the Appiani, and in 1399 through Gherardo Appiano were subjected to the tyranny of the Visconti of Milan, who in their turn surrendered them in 1406 to the Florentines. But to the latter the Pisans made a heroic resistance, and after a long siege yielded only to famine. In 1494 they regained their independence under the leadership of Simone Orlandi and with the assistance of Charles VIII. of France. The Florentines again laid siege to Pisa July 31, 1499; but the city gallantly resisted this as well as subsequent attacks by the Florentines and by Louis XII. of France till June 8, 1509, when they surrendered to the former on condition of a full amnesty. From that period Pisa remained part of the territories of Florence, and subsequently of Tuscany.—The numerous Latin inscriptions in Pisa have been described by Paganini, Tantani, and Lupi (Pisa, 1872–'5).

PISANO. I. Nicola, an Italian sculptor, born in Pisa about 1200, died about 1278. He was the son of a notary, and seems to have derived his art chiefly from the models of antiquity. He was the first to inaugurate the renaissance period in Italian statuary. Among his most celebrated works are the marble urn of St. Dominic at Bologna (1225–'31), which he finished only in part, the pulpit in the baptistery of Pisa (1260), which was placed under the special guardianship of the law, and a still finer one for the cathedral of Siena (1266). His architectural works comprise the magnificent basilica of St. Anthony (*il Santo*) at Padua (1231, completed in 1407), the Frari church at Venice, and Santa Trinità at Florence (about 1250), and subsequently the campanile for the church of San Nicola at Pisa, which served as a model for that of Bramante in the Belvedere of the Vatican and for Sangallo's enclosure of "St. Patrick's well" at Orvieto. **II. Giovanni**, an Italian architect, son of the preceding, born in Pisa about 1240, died in 1320. He studied under his father, imitated many of his works, and executed with his assistance or alone the fountain near the cathedral of Perugia and the church of Santa Maria della Spina at Pisa. He attained world-wide celebrity by designing the Campo Santo in the latter city (see CEMETERY), at which he worked from 1278 to 1283, when he constructed the Castel Nuovo at Naples, the model of the Paris Bastile. His sculptures are inferior to his father's; among the best of them are the marble shrine for the high altar at the cathedral of Arezzo and the mausoleums of several popes. There was another Giovanni Pisano, who was a pupil and colaborer of Donatello. **III. Andrea.** See ANDREA PISANO.

PISCATAQUA, a river flowing between New Hampshire and Maine. It rises in East pond, between the towns of Wakefield, N. H., and Newfield, Me.; thence to Berwick Lower falls it is called Salmon Falls river, after which until its junction with the Cocheco it is sometimes called the Newichawannoc; thence to the ocean, which it enters about 3 m. below Portsmouth, it has the name Piscataqua. The harbor, from Portsmouth to the sea, owing to the strong tides, is never obstructed by ice, and is one of the best in the United States.

PISCATAQUIS, a N. county of Maine, drained by the Piscataquis and the west branch of the Penobscot and their tributaries; area, 3,780 sq. m.; pop. in 1870, 14,403. Its surface is dotted over with hills and mountains, the highest of which is Mt. Katahdin, and contains a large number of lakes, of which the principal are Sebec, Pamedumcook, Caribou, Chesuncook, and Moosehead; the last named is the largest, and is 35 m. long by from 4 to 12 m. wide. A large portion of the land is yet unsettled. The Bangor and Piscataquis railroad traverses the S. part of the county. The chief productions in 1870 were 12,276 bushels of wheat, 36,142 of Indian corn, 140,652 of oats, 35,485 of barley, 352,915 of potatoes, 420,362 lbs. of butter, 57,419 of cheese, 80,753 of wool, and 41,187 tons of hay. There were 2,938 horses, 4,714 milch cows, 2,250 working oxen, 5,764 other cattle, 21,805 sheep, and 2,295 swine; 7 manufactories of carriages and wagons, 2 of leather, 2 of clothing, 4 of saddlery and harness, 7 of woollen goods, and 20 saw mills. Capital, Dover.

PISCICULTURE. See FISH CULTURE.

PISE, Charles Constantine, an American clergyman, born in Annapolis, Md., in 1802, died in Brooklyn, N. Y., May 26, 1866. He graduated in Georgetown college, entered the society of Jesus, and went to study theology in the Roman college. After two years the death of his father compelled him to leave the society and return home. He taught rhetoric in Mount St. Mary's college, Emmettsburg, till 1825, when he was ordained priest, and soon afterward called to minister in the cathedral of Baltimore. While there he published "History of the Church" (5 vols., Baltimore, 1827-'30), and "Father Rowland" (1829), his best work. He became successively assistant pastor of St. Patrick's, Washington, chaplain of the senate of the United States, and assistant in St. Peter's church, New York, of which he became pastor in 1848. In 1849 he was appointed to St. Charles Borromeo, Brooklyn, and continued its pastor till his death. Besides the above, his most important works are: "Aletheia, or Letters on the Truth of the Catholic Doctrines" (New York, 1843); "St. Ignatius and his First Companions" (1845); and "Christianity and the Church" (1850).

PISGAH, a mountain of Palestine, E. of the mouth of the Jordan. Its identification has been a matter of much doubt in modern times, though it was known to Eusebius and Jerome. The Bible associates it with Nebo, from the top of which Moses looked over the land of promise. It has been thought that Nebo was the highest summit, and Pisgah the general name of the mountain; and explorers have sought to identify the summit of Nebo. In 1806 Seetzen suggested that Jebel Attarus, about 12 m. S. of Heshbon, was Nebo, and in 1812 Burckhardt accepted this view as probably right, as did Irby and Mangles in 1818, though with some hesitation. Burckhardt and Robinson mention another summit, Jebel Osha, about 15 m. N. of a line drawn eastward from Jericho. But it has been objected that Osha is too far N. and Attarus too far S. for the Scriptural account, which places the mountain opposite Jericho. De Saulcy in 1863 identified Mt. Nebo with Jebel Neba (or Nebbeh), 4 or 5 m. S. W. of Heshbon. In 1864 the duke de Luynes passed over Jebel Neba without knowing its Arabic name, but, believing it to be Mt. Nebo, named it in his chart Jebel Musa, the mountain of Moses. The same year Tristram seems to have confirmed this identification. In 1867 Capt. Warren, of the English Palestine exploration fund, ascended Jebel Neba, which he describes as a hill on the edge of the swelling ground at the W. end of the Belka, about 2,670 ft. above the Mediterranean, while in the wady N. of it are springs known as Ayin Musa, the fountain of Moses. In 1873 Prof. John A. Paine, of the American Palestine exploration society, ascended Jebel Neba and the neighboring heights. He reports that the highest point of the ridge, 4¼ m. from Heshbon, is called Shefa Neba, the crest of Nebo, and is 2,725 ft. high. Westward from this crest is a cultivated depression called Sahl Neba, the plain of Nebo, W. of which rises Jebel Neba, a short round summit, 2,685 ft. high, and 1,100 ft. above Ayin Musa. This he identifies with Mt. Nebo; but neither it nor the crest affords a prospect fully equal to that described in the Scripture. A mile and a quarter S. W. of Jebel Neba, however, is a triple summit known as Jebel Siaghah, only 2,360 ft. high, but jutting out far to the west, and falling away so rapidly to the west, southwest, and northwest that it commands a more extended view than the higher summits E. of it. This S. W. point of Jebel Siaghah Prof. Paine identifies with Mt. Pisgah, and he describes it as overlooking two thirds of the Dead sea, the hill country of Judah, the buildings of Bethlehem and Jerusalem, the hills about Nazareth, the Jordan valley, and Peræa. The Rev. John L. Porter visited the same region in 1874, and reports that several neighboring peaks are now called by the common name Jebel Neba.

PISIDIA, in ancient geography, an inland territory of Asia Minor, bounded N. by Phrygia, N. E. and E. by Isauria and Cilicia, S. by Pamphylia, and S. W. and W. by Lycia and Phrygia. From the S. slope of Mt. Taurus several rivers flowed into the Pamphylian gulf, among them the Cestrus and the Catarrhactes. On the north the mountain streams form salt lakes. Pisidia became a separate province on the division of the Roman empire by Constantine the Great, having previously been included either in Phrygia or Pamphylia. Olives, salt, the gum storax, iris (a root from which perfumes were manufactured), and the wine of Amblada were produced. The chief towns were Antiochia, Sagalassus, and Selge, the last mentioned being the most important. The inhabitants were mountaineers, never conquered either by the Syrian kings or by the Romans, although the latter held possession of some of their chief towns. In the time of Strabo they were ruled over by petty chiefs, and derived their subsistence mainly from plundering their neighbors. The mountainous parts of ancient

Pisidia are now inhabited by Caramanians, a wild predatory people. The country, which is included in the Turkish vilayet of Konieh, is rarely visited and little known.

PISISTRATUS, tyrant of Athens, born about 612 B. C., died in 527. He was the kinsman and friend of Solon, and accompanied him in the expedition for the recovery of Salamis. After the adoption of the constitution of Solon, the old rivalry revived between the three parties in Attica: the proprietors of the plain, headed by Lycurgus; the party of the coast, headed by Megacles, the son of Alcmæon; and the party of the highlands, consisting of the poorer classes, headed by Pisistratus. Having wounded himself, Pisistratus appeared one day in the agora, complaining that he had been attacked, and asking for a guard. A company of 50 club men was assigned him, which soon being increased, he seized the acropolis (560), and compelled his leading opponents to flee. A coalition was formed against him, and he was driven from the city and remained in exile six years; but dissensions arose among his enemies, and Megacles offered him the sovereignty on condition that he should marry his daughter. This was agreed to, and Pisistratus entered Athens in a chariot by the side of a stately woman named Phya, clothed in the costume of Minerva, heralds crying out: "Athenians, cordially receive Pisistratus, whom Athena has honored above all other men, and is now bringing back into her own acropolis." He thus gained possession of the government, and married the daughter of Megacles; but not choosing to have children by a member of a family deemed accursed, he so incensed the Alcmæonidæ that they again united with the party of Lycurgus and expelled him. Ten years later he landed at Marathon with mercenaries and troops led by Lygdamis of Naxos, and reëstablished himself in power. He now took into pay a body of foreign mercenaries, exiled some of his enemies, and kept the children of many of the principal citizens as hostages. His reign, however, seems to have been mild, and received the commendation of Herodotus, Thucydides, and Aristotle. Among other great works, he commenced the temple of the Olympian Jupiter on a plan so large that it was not finished till the time of Hadrian. He is said to have instituted the greater Panathenaic festival, and under his encouragement the poems of Homer were collected and written down. He is said to have been the first person in Greece who collected a library, to which he allowed the public access. He conquered Naxos, placing Lygdamis upon the throne, and wrested Sigeum from the Mytileneans. He was succeeded by his sons. (See HIPPIAS AND HIPPARCHUS.)

PISSELEU, Anne de. See ÉTAMPES, DUCHESS D'.

PISTACHIO (Gr. πιστάκιον), the name of an edible nut and of the tree which bears it (*pistacia vera*), which is a native of western Asia, and is generally cultivated in southern Europe. The tree was formerly placed in the *terebinthinaceæ*, but that order is now united with the cashew-nut family (*anacardiaceæ*), of which we have several native examples in the sumachs. The pistachio is a tree 20 or 30 ft. high, its leaves with three or five leaflets; the small flowers are diœcious, the males in close clusters, and the females in a loose raceme; the fruit is a sort of dry drupe, about the size and shape of an olive, the exterior portion somewhat woody and enclosing the seed, which is known in commerce as the pistachio nut. The seeds are irregularly oval, about an inch long, of a reddish green externally, and within of a bright green, exceedingly pleasant to the taste, and in the countries where they grow largely eaten as a luxury. The great fondness of the Turks and Greeks for the seeds is said to be the reason why so few find their way into commerce. In Europe they are candied, or coated with sugar in the same manner that almonds are sugared; they yield by expression an oil similar to that of almonds. In this country their use is confined to the confectioners and pastry cooks, who find in their cotyledons a harmless green coloring matter which is used to color ices and similar articles; it gives a more pleasing green than spinach juice, which is often used for the same purpose. The tree is hardy in England, in sheltered localities, and in favorable portions of France; it would no doubt succeed in our southern states. There are about five other species of *pistacia*, one of which, *P. lentiscus*, produces the resin mastic (see MASTIC), and another, *P. terebinthus*, yields the Ohio turpentine, and also curious galls.

Pistachio (Pistacia lentiscus).

PISTOJA, or **Pistoia** (anc. *Pistoria* or *Pistorium*), a fortified city of Italy, in Tuscany, on the left bank of the Ombrone, 21 m. N. W. of Florence; pop. about 13,000. It is situated on the railway from Bologna to Florence, and is connected by another with Lucca and Pisa. On approaching the city from the north, the Bologna railway passes over the heights of the Apennines, presenting an extensive view of the surrounding country. The hilly region is traversed by long tunnels. The town contains fine palaces, and retains many of its ancient churches, which are generally remarkable for their architecture and works of art. The ornaments of the high altar in the cathedral, stolen by Vanni Fucci, were in 1466 replaced by a sumptuous altar of silver and of other exquisite material at which artists worked for about 150 years. The baptistery opposite the cathedral is an octagon, although called San Giovanni Rotondo. It dates from the 14th century, and is built of black and white marble in alternate layers. One of the most interesting of the other churches is that of Sant' Andrea, believed to have been the original cathedral. Iron, wool, silk, and leather are manufactured, and there are considerable works for making cannon and other firearms. Peculiar rock crystals called *diamanti di Pistoja* are found here, and extensively worked.—In the middle ages the town of Pistoja and its environs formed an independent republic. About 1306 it became subject to Florence.

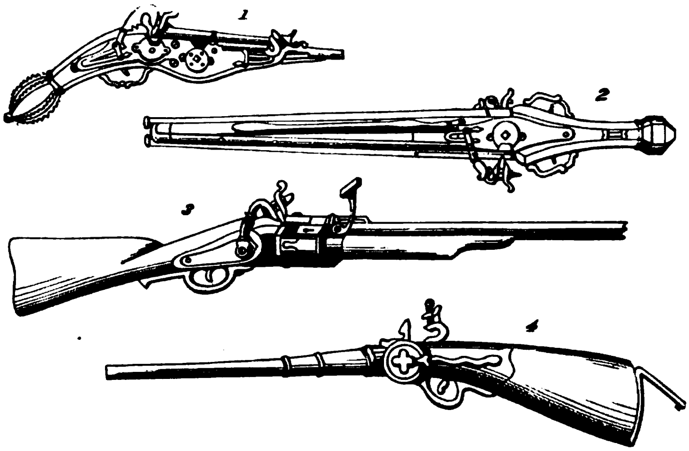


Fig. 1.—1. Double-barrel Pistol with two Wheel Locks, 1612. 2. Double-barrel Pistol with two Wheel Locks, time of Charles I. 3. Revolver Carbine with Flint Lock, time of Charles I. 4. Repeating Carbine, time of Cromwell.

PISTOL, a small, light firearm, intended to be used with one hand. Every other small arm is handled by placing the butt against the shoulder when it is to be fired, using both hands; but the pistol is fired at arm's length, using but one hand, and is therefore particularly adapted for use by horsemen, and for defence of the person. The generally received account of the origin of the name is, that it was derived from the city of Pistoja, where pistols were first made; but this derivation is disputed, and Frisch and Diez consider the root the same as that of piston and pestle, at first meaning pounder or bludgeon. *Pistillus* is the Latin word for pestle. The word pistol was used by Strype in 1575, and by Shakespeare in 1599 and 1600, but there is nothing in its use by them to show that it meant a firearm. *Dag* is used by Strype as synonymous with pistol. In the latter part of the 15th century the Spanish cavalry was provided with a firearm which in some degree must have approached the pistol; it was a matchlock arm. After the invention of the wheel lock (see Musket) pistols were introduced into continental armies, so that they had become well known before the middle of the 16th century. They were used by French cavalry and infantry in 1544, and by German cavalry and infantry about ten years later. Pistols were probably introduced into England from Holland about the beginning of the 17th century. The pistols at first used had short barrels, and the stock made a large angle with the barrel. The butt was large and spherical, and this may have given rise to the name. Afterward the barrel was lengthened, and the butt or stock was placed nearly in the prolongation of the barrel. In some cases the stock was made like that of a musket, but smaller; in others stocks like those now existing were used. The taste or necessity of the purchaser regulated the style. As the musket improved in the course of years, so did the pistol, and in some cases the barrels were rifled. In European armies its use has in general been confined to the cavalry. In 1584 a carbine revolver was invented, but it burst in the trials. In 1607 a double-barrelled pistol with wheel lock was used by German cavalry. In 1618 Gustavus Adolphus introduced wheel-lock pistols into his armies. During the 18th century little change was made in pistols. The flint lock was applied to them, as it was to the musket. Many specimens were highly ornamented, and they were used by all mounted officers, and were sometimes worn on the person. In 1806 the Swedish cavalry was armed with pistols having an attachable carbine breech, by using which a more accurate aim could be obtained. The same arrangement is in use at the present day. About 1830 a percussion-cap, rifled pistol, single-barrelled, was

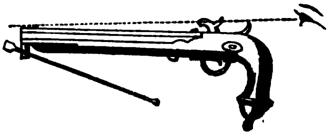


Fig. 2.—Delvigne's Pistol.

designed by Delvigne. At 200 yards and more it made a better target than the French musket of that day.—In 1836 the revolving pistol as it now exists was patented by Samuel Colt of Connecticut. It has a single barrel, in rear of which is a cylinder, bored with five, six, or more chambers, whose axes are parallel to the axis of the cylinder, and on a circle whose centre is in that axis. The axis of the cylinder is parallel to the axis of the bore of the barrel, and the bore of the chambers is the same as that of the barrel. Each chamber has a nipple or cone which communicates with it by a hole. In rear of the chambers is the lock, which is enclosed in the handle or stock. On the rear of the cylinder is cut a circular ratchet concentric with it, which is actuated by a pawl attached to the hammer. The number of teeth in the ratchet is the same as the number of chambers in the cylinder. The ratchet and pawl are so arranged that in the act of cocking the piece the pawl forces the cylinder to move through one fifth, one sixth, &c., of the circumference of a circle, the arc depending upon the number of chambers in the cylinder. Supposing that the barrel and a chamber have their axes coincident, and the hammer is down, resting on a nipple, the act of cocking will bring the next chamber into line with the barrel.

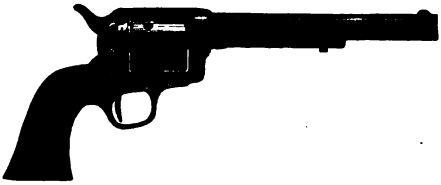


Fig. 3.—Colt's New Model.

A bolt flies out after the pawl has done its work, and engages in a corresponding slot in the cylinder, locking it in place during the act of firing. This bolt is lifted out of its slot by the hammer before the revolution of the cylinder begins, leaving the cylinder free to move about its axis. In rear of the cylinder is a metal frame in which is contained the lock, and to which is attached one end of the axis upon which the cylinder is revolved, the other end being fastened below the barrel. In rear of this frame is the stock, which is of wood or ivory, and of such shape as may be desired. For a long time after its invention, the revolving pistol was loaded by inserting the cartridges into the chambers at their front ends, ramming them successively by a lever rammer attached to the barrel, and then capping them. This pistol was gradually introduced into all the armies of the world through the energy of the inventor, and is the first example of a successful repeating arm. After its invention the use of pistols as military arms became much more general, and the number manufactured was vastly increased. About 1845 Lefaucheux invented a revolving pistol which was adapted to a metallic cartridge. After the expiration of Colt's patent in 1857, this invention was introduced generally, and at this time no revolving pistols are made that do not use the metallic cartridge. The principal manufactories of revolving pistols in the United States are Colt's, Smith and Wesson's, and Remington's. There is little difference of principle in the pistols made by these firms.

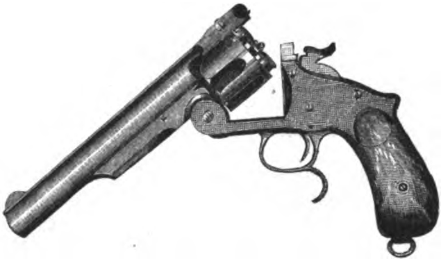


Fig. 4.—Smith and Wesson Pistol.

In the Colt pistol the cartridge shells, after they have been fired, are ejected singly, and in the Smith and Wesson they are ejected simultaneously by the action of breaking down the barrel; that is, there is a hinge in the frame of the pistol, by opening which the ejection of all the shells is effected. In the Remington pistol, model of 1875, the cartridge shell is ejected by opening the breech, in the manner shown in the engraving. The United States cavalry and the United States navy are armed with the Colt pistol. The British army uses the Adams pistol, which acts on the same principle as Colt's. The Russian army uses the Smith and Wesson pistol, and the other European armies use pistols made in France and Belgium. It is difficult to determine the number of revolving pistols that have been made in the United States and Europe; but for the ten years ending with 1865, the number sold by Colt's armory alone was more than 550,000. To none of these was the metallic cartridge applied. The annual production at this time (1875) in the United States exceeds 250,000 of all sizes. In Belgium the annual production exceeds 300,000. The calibres of revolving pistols are at present ·45, ·44, ·42, ·38, ·32, ·30, and ·22 in., and the weights vary from 2¼ lbs. to 6 oz.

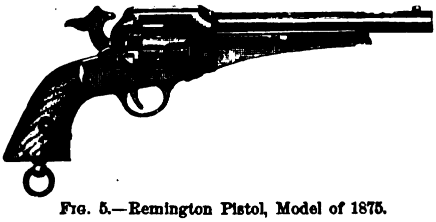


Fig. 5.—Remington Pistol, Model of 1875.

The calibre of the United States cavalry pistol is ·45 in., and the weight 2 lbs. 6 oz. The cartridge is made with a copper shell, central fire, and internal priming, and contains 30 grains of powder; and the ball, which is cylindro-conical, weighs 250 grains. The United States navy also uses a single-barrel pistol, of 5 in. calibre, with metallic cartridge ammunition.

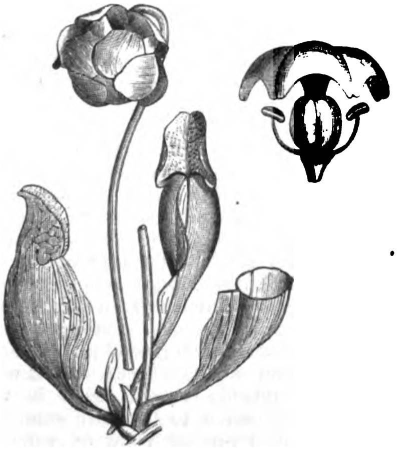
PISTOLE, the name formerly applied in several countries of Europe to gold coins of various values. It was equivalent in Spain to a quarter doubloon ($3 90). In Germany it was sometimes applied to coins bearing the name of the state or sovereign who coined them, and worth about $3 70. The old Italian pistole or *doppia* was worth from $3 09 to $7 02. Of late years, and especially since the introduction of new systems in Spain and Italy, the name is seldom heard.

PITAVAL, François Gayot de, a French author, born in Lyons in 1673, died in Paris in 1743. He left the army to become an advocate, and compiled many works, the principal of which is *Causes célèbres et intéressantes* (20 vols., Paris, 1734–'43), of which continuations appeared by François Richer (22 vols., Amsterdam, 1772–'88; German translation, 4 vols., Jena, 1792–'5, with a preface by Schiller). Numerous abridgments and translations have appeared. A similar compilation has appeared in Leipsic since 1842, under the title *Der neue Pitaval;* the first 30 volumes were edited by Hitzig and Häring, and subsequent volumes by Vollert, the total work comprising in 1875 nearly 50 vols.

PITCAIRN ISLAND, an island of the Pacific ocean, in lat. 25° 3′ S., lon. 130° 8′ W.; extreme length about 2¼ m., breadth 1 m. It is elevated, the greatest height being nearly 2,500 ft. above the sea, and is surrounded by cliffs which preclude the possibility of landing except in two or three spots. The temperature ranges between 59° and 90°, and the climate is remarkably healthy. There are a few small streams, but they are liable to fail at certain seasons, when the inhabitants depend upon water preserved in tanks. The soil is rich and fertile, and the island is everywhere thickly clothed with a luxuriant vegetation. Several tropical fruits and vegetables are indigenous, and many others, together with some of those belonging to temperate regions, have been successfully introduced. All the domestic animals except the horse have also been introduced, and goats are very numerous in the more inaccessible parts of the island.—Pitcairn island was discovered by Carteret in 1767, and named after one of his officers who was the first to see it. Its chief interest, however, is derived from the mutiny of the Bounty, a vessel sent by the British government to convey plants of the breadfruit tree from Tahiti to the West Indies. (See Bligh, William.) The Bounty arrived at Tahiti at a wrong season for transplanting, and was compelled to remain there six months, during which time the crew formed connections with the natives. A few days after sailing, April 28, 1789, the crew mutinied, and when they had sent Capt. Bligh and those who would not join them adrift in an open boat, they bore away for Tahiti. Here one of the crew named Christian and eight others, after the rest had landed, induced nine native women and nine men to come aboard, when they put to sea and were not heard of for many years. In 1808 Capt. Folger of Nantucket, while on a sealing voyage in the Pacific, called at Pitcairn island, and, having supposed it to be uninhabited, was much surprised to see a canoe with two men of a light brownish complexion approach his vessel, and request in good English that a rope should be thrown to them. They were descendants of the remnant of the long lost crew. Determined to cut off all traces of themselves, when the mutineers reached Pitcairn island they ran the Bounty ashore, where they stripped and burned her. Christian and his associates took the Tahitian women as wives and reduced the men to bondage. They appear to have got on well for a time, made good houses, and cultivated a considerable extent of ground; but at length the slaves rebelling, they were forced to destroy them all, not however before several of the masters had been killed in the affray, among whom was Christian. Within the next few years several of the others died, and at the time of Capt. Folger's visit Adams was the only survivor of the mutineers. (See Adams, John.) He drew up a simple code of laws by which the islanders are still governed, and to which they are very much attached. They are an honest, kind-hearted, religious people, of very simple habits. In 1856, the island being too small for them, the whole community was removed, by some well-wishers in England and Australia, to Norfolk island; but the greater part of them were dissatisfied with the change, and early in 1859 two families, numbering 17 persons, returned to Pitcairn island.

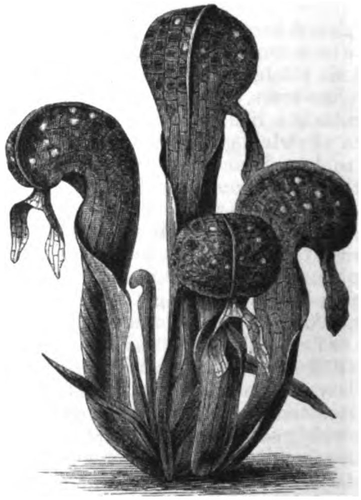
PITCH (Gr. πίττα), a black resinous substance, commonly known as black pitch, constituting the residuum when the volatile portions of tar are driven off by heat. It is soft and sticky when warm, but becomes solid and brittle when cold. It is one of the products of the pine tree classed in commerce as naval stores, and is largely used in ship building to pay the seams and thus render them impervious to water. For this purpose it is mixed with a small portion of oil, to render it less brittle. It is also used in medicine as a mild stimulant and tonic, and is administered in pills for cutaneous diseases and for piles. In Europe pitch is manufactured chiefly from the tar produced in northern regions from *pinus sylvestris* (Linn.) and *P. Ledebourii* (Endl.) or *larix Siberica* (Ledeb). These trees form the vast forests of arctic Europe and Asia. The pitch used in this country is all made from the distillation of tar furnished by various species of pine, especially *pinus palustris* of the southern states, from which immense quantities are prepared in North Carolina and the southern parts of Virginia. In New Jersey, New England, and Pennsylvania west of the Alleghany mountains, tar and pitch are made from *pinus rigida*, or pitch pine, and other species.—Burgundy pitch is used for plasters, and when applied for some time to the skin acts as a rubefacient, exciting slight inflammation and serous effusion, and relieving chronic affections of the chest and rheumatic pains. It is prepared from the resinous matter that exudes from the Norway spruce (*abies excelsa*). The resin is melted in hot water, and strained through coarse cloths. Burgundy pitch is produced in Finland, the Black Forest, Austria, and Switzerland. The pure article is rather opaque, yellowish brown, hard and brittle when cold, yet gradually takes the form of the vessel in which it is kept. It has an aromatic and very agreeable odor, which is quite marked when heated; it is strongly adhesive, and breaks with a clear conchoidal fracture. Few drugs are more subject to adulteration than Burgundy pitch. The true article is seldom met with in this country, the substance usually sold here under that name being made up of various mixtures of common rosin, wax, and fatty matters.—Canada pitch resembles the preceding in its properties, and is prepared from the inspissated juice of the hemlock spruce (*abies Canadensis*). The juice exudes spontaneously from old hemlock trees, and hardens upon the bark, which is stripped off, broken in pieces, and boiled in water. The pitch as it rises to the surface is skimmed off, and is purified by a second boiling. It consists of resin with a little volatile oil. It melts at 198° F., and is almost too soft at the temperature of the body to be worn as a plaster. The finer quality of Canada pitch, such as hardens in clean tears in the older trees, commands a high price, being sold under the name of "spruce gum," and is used as chewing gum. The poor grades are often sold as "hemlock gum."—The residue from the distillation of coal tar is also called pitch, and is used as a coloring ingredient of a coarse black varnish much used for protecting iron work from rust. An increase of temperature produces decomposition, with the formation of a product having the consistency of butter.—Asphalt is sometimes called mineral pitch, or Jew's pitch. (See ASPHALTUM.)

PITCHER PLANTS, a general name for plants with leaves wholly or partially transformed into receptacles for water. This occurs in plants widely separated botanically, and though the grouping of them together is not a scientific classification, it serves to present at one view several which have no other value than the interest which is attached to this peculiarity of structure. (See LEAF.) The water found in some of the *ascidia*, as the pitchers are botanically termed, may have been collected from rains, but in others the mouth of the pitcher is so protected that it is impossible for it to have been derived from this source, and it must be secreted by the leaf itself. Several plants collect rain water without having proper pitchers to receive it; a notable instance of this is the traveller's tree of Madagascar (*Ravenala Madagascariensis*), the finest of the banana family; this has very large oval leaves, the sheathing petioles of which are distended at the base, forming a capacious cup into which the water that falls upon the blade of the leaf is conveyed by the channelled midrib and petiole; the thirsty traveller has only to pierce the base of the petiole to obtain a supply of fresh and limpid water. A similar collection of water takes place, though on a much smaller scale, at the base of the leaves of *Tillandsia utriculata*, a Florida plant of the related pineapple family, in which the base of the leaf is sufficiently dilated to hold several ounces of water; this plant being an epiphyte and found only growing on the trunks of trees, this may be regarded as a provision against drought.—Among the pitcher plants proper, our peculiarly North American genus *Sarracenia* presents in its six species several interesting forms; all these except one are restricted to the Atlantic states near the coast, from Virginia southward. The exceptional species is *S. purpurea*, which grows from Florida to Newfoundland and extends westward as far as Minnesota, but west of the Alleghanies is not found south of Ohio and Illinois; this was the first species made known, and upon it Tournefort founded the genus, which he dedicated to Dr. Sarrazin of Quebec, who forwarded the plant with a botanical account of it to Europe. The sarracenias are bog-loving perennials, and have tubular leaves in a radical cluster; the leaves vary much in size as well as in form and color in the different species, and in all are marked by a network of veins; structurally these pitchers, or trumpets, as they are often called, are regarded as leaves with a very broad petiole, which is joined at the edges to form a trumpet-like tube, the suture where the edges unite being marked by a wing running the whole length; the proper blade, very small in proportion to the petiole, appears as an appendage at the end of the tube, called

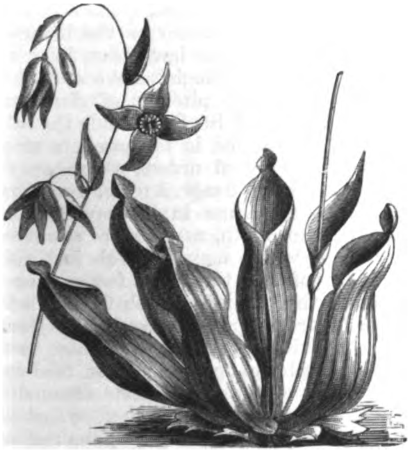


Northern Pitcher Plant (Sarracenia purpurea).

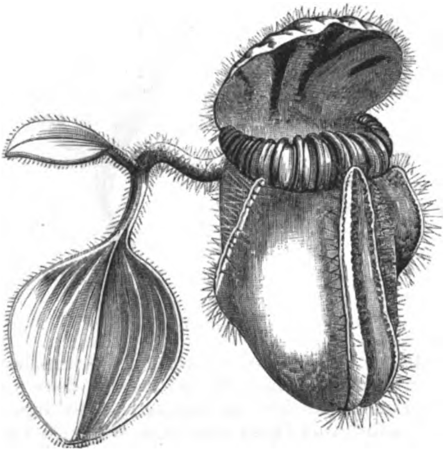
the hood or lamina, and is regarded as the lid of the pitcher, though it never closes it, but in some species bends over the opening and more or less covers it. The pitchers have their inner surface clothed with stiff hairs pointing downward, and in one species at least there is near the orifice of the tube a sweetish exudation. The tubular leaves or pitchers are found partially filled with water containing numerous dead and more or less decomposed insects. From the centre of the cluster of leaves the naked flower stalks are produced, each of which bears a large, solitary, nodding flower; the calyx, with three bractlets at its base, has five persistent, thick, colored sepals; the five oblong petals are incurved over the pistil and deciduous; the globose five-celled ovary has a short style surmounted by a broad umbrella-shaped expansion, which is petal-like and five-angled, and has five delicate rays starting from the centre, and terminating under the angles on the margins in as many minute hooked stigmas; the numerous stamens are inserted below the ovary and covered by the umbrella-like expansion of the pistil. The northern species, *S. purpurea*, is quite common in peat bogs within its limits, and is popularly known as pitcher plant, huntsman's cup, and side-saddle flower, the last name being of obscure application, though the flower is shaped somewhat like a pillion. The leaves, 4 to 6 in. long are curved upward, have a broad wing and a short, erect, open hood; they are often veined with purple and tinged with that color; the flower, on a stalk a foot high, is deep purple: a rare variety has yellowish green flowers and leaves without purple veins. A few years ago the root of this was much lauded as a remedy for smallpox, and wonderful cures by it were reported in England; careful trials in this country have shown it to be quite valueless. The parrot-beaked pitcher plant (*S. psittacina*) is the smallest species; its leaves, only 2 to 4 in. long, marked with white spots and purple veins, are spreading, with the hood inflated, beaked, and so bent over as to cover and protect the orifice of the tube; the flower stalk is a foot high, the flower purple; this is confined to the pine-barren swamps of Georgia and Florida. The red-flowered trumpet-leaf (*S. rubra*) is found in the sandy swamps of North Carolina and Georgia; its trumpet-shaped leaves, 10 to 18 in. long, are erect, paler above and marked with purple veins; the hood is erect, ovate, with a point or beak at the top and hairy on the inside; the flower stalks, taller than the leaves, have reddish purple flowers. Drummond's pitcher plant (*S. Drummondii*) occurs in the swamps of Florida and middle Georgia; its erect trumpet-shaped leaves are 2 ft. long, and are the showiest of all, as the upper part of the tube and the erect hood are white, handsomely marked and netted with purple veins; the flowers, 3 in. across, are purple. The spotted pitcher plant (*S. variolaris*), found from North Carolina to Florida, has its erect leaves 6 to 12 in. long, the ovate hood concave and arching over the opening in the tube, which is yellowish near the top and spotted with white; the flowers, about 2 in. broad, are yellow and on stems shorter than the leaves. The largest species is the yellow pitcher plant (*S. flava*), called trumpet-leaf, trumpets, and watches; the erect leaves have a wide mouth, and an erect rounded hood, which is narrowed at the base and yellow; they are 2 to 3 ft. long and of a light yellowish green color; the flower stalks, about as long as the leaves, have yellow unpleasantly scented flowers 4 or 5 in. across, the petals becoming long and drooping; this species is found from Virginia to Florida, often occurring in large tracts. Sarracenias are much cultivated by collectors of interesting plants; the common species (*S. purpurea*), set in a vase or bowl of peat moss and properly supplied with water, makes a pleasing window plant, but the others require greenhouse treatment; they grow best in a mixture of sphagnum moss and peat, and require an abundance of water while growing, and but little while at rest.—On the Pacific coast the *Sarraceniaceæ* are represented by a most interesting genus, *Darlingtonia*, of which but one species, *D. Californica*, is known. Its chief botanical difference from *Sarracenia* is in its five-lobed style; the shape of the leaves is very unlike any in that genus; when full grown, they are from 12 to 18 in. long, tubular and dilated upward, with a broad wing, and singularly twisted about half a turn; the summit of the tube is vaulted and curved over like a hood, beneath which is a small orifice; the blade of the leaf is represented by an appendage at the end of the tube, of two diverging lanceolate lobes and shaped somewhat like a fish's tail; the upper


California Pitcher Plant (Darlingtonia).

portion of the tube is beautifully mottled with white and netted with pinkish veins; the flower stalk, from 1 to 4 ft. long, is furnished with straw-colored scales, and bears a single nodding flower about 2 in. in diameter, with five straw-colored sepals and as many purple petals. The leaves contain water in which large numbers of insects are drowned; the orifice of the tube is so completely protected that it is well nigh impossible that the liquid should be other than a secretion of the plant. This was first found by the botanist of the Wilkes exploring expedition in 1842 on the upper Sacramento, and has since been found in other localities; it was described by Torrey, who dedicated it to the late Dr. William Darlington of West Chester, Pa. The *Darlingtonia* succeeds admirably in cultivation with the same treatment required by sarracenias. Another genus of the same family is *heliamphora*, also American, but found only in the mountains of Venezuela; its leaves are open pitchers with an oblique mouth, as if the pitcher were not quite completed, and the blade, so strongly developed in *Darlingtonia*, is reduced to a minute concave appendage at the apex; this differs from the other genera in having several flowers upon the stem, which are small, nodding, white, or pale rose-colored. There is but one species, *H. nutans*, which does not appear to have been brought into cultivation.—The Australian pitcher plant, the smallest of all, is *cephalotus follicularis* (Gr. κεφαλωτός, headed, in reference to the form of the stamens). There is but one species, which inhabits the swamps in King George's sound. It has a very short stem, bearing ordinary leaves of an oblong or elliptical form, and also others which are dilated to form neat little pitchers; intermediate stages between the pitchers and the ordinary leaves have been observed, showing them to be leaves peculiarly modified. The pitchers are from 1 to 3 in long, and in a well grown plant are arranged in a close circular tuft; each has two strong hairy ribs in front and one on each side; they are green, spotted and shaded with purple or brown. At the top of the pitcher is a much thickened rim, which is handsomely and regularly grooved, and against it the concave, hairy, pink-veined lid neatly fits. The flowers, which are not showy, are borne in a long spike; each has six pistils, which ripen a single seed each. This genus has been a troublesome one to botanists, who have placed it in several different families, including one proposed especially for it; Bentham and Hooker, in *Genera Plantarum*, admit it as an anomalous genus of the saxifrage family.—Some species of *dischidia*, a tropical genus of milkweeds (*asclepiadaceæ*), are to be enumerated among pitcher plants; these climb to the tops of the tallest trees, and among their upper leaves are some which are developed as pitchers, while others retain their normal form.—The most striking of all the pitcher plants are furnished by the genus *nepenthes*. They are inhabitants of tropical swamps in the East Indies, Madagascar, Australia, and New Caledonia, and now number over 30. The genus, while it presents affinities with several families, is too unlike all others to be united with them, and stands in a family by itself, *nepentheæ*, near the birthworts (*aristolochiaceæ*). The plants are half shrubby with prostrate or trailing stems; the apetalous flowers are diœcious, in a slender raceme; the male flowers have a four-parted calyx, with about 16 stamens united into a column to which the united anthers form a spherical head; the female flowers have a three- or four-cornered ovary, with as many cells, the numerous ovules in which ripen into elongated seeds with a very long, loose, membranous coat. The alternate leaves have the petiole winged

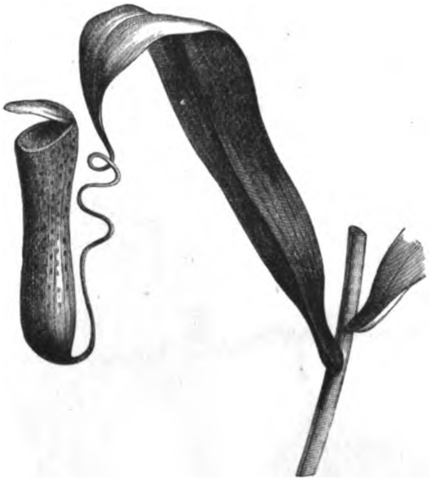


Venezuela Pitcher Plant (Heliamphora).



Australian Pitcher Plant (Cephalotus follicularis).

at the base; above this wing the midrib is greatly prolonged, curved or spirally twisted, and at the end expanded into an urn or pitcher, the mouth of which is furnished with a lid attached by a sort of hinge, and is sometimes open and sometimes closed; the lid does not open until the leaf is completely developed, and before this takes place the watery liquid is secreted and partly fills the pitcher. These wonderful leaves have been erroneously said to secrete water for the use of travellers in arid regions where no other supply exists; the fact is that the plants are only found in swamps, and cannot endure a dry atmosphere. The pitchers vary greatly in size and form, and also in color and markings. The species first introduced, and for a long time the only one in cultivation, *N. distillatoria*, has narrow cylindrical pitchers, 6 or 8 in. long, which are of the same light green color as the leaves; this is the easiest of cultivation, enduring a lower temperature than the others; its variety *rubra*, a chance seedling, has the pitchers of a deep blood-red color, and is ornamental and rare. The species is so abundant in Ceylon that the natives use the strong midribs for cords and withes. *N. phyllamphora* and *N. gracilis* are other species having green pitchers. Some have the pitchers handsomely variegated; of these *N. Rafflesiana* may be taken as an example; it is a very robust plant, with pitchers 6 to 12 in. long; the mouth of the pitcher has a handsomely annulated border and a large lid; each side of the front is a broad wing, fringed with long hairs upon the edge; the leaves are dark green, and the pitchers are of the same color beautifully spotted and blotched with red. As the plants of this and some allied species become old their pitchers assume a very different shape; in the young leaves they are largest at the base, have two wings in front where the midrib is attached, and the oblique mouth of the pitcher looks toward the midrib; in the old plant the base is much narrowed, the wings are wanting, and the mouth of the pitcher looks from the midrib; were it not that every intermediate state occurs on the same plant, the two extremes would be taken as belonging to different species. The nepenthes are increased by cuttings and sometimes by seed; for their cultivation they require a moist atmosphere and a temperature not less than 70°; they are usually grown in baskets of peat and sphagnum and abundantly supplied with water.—The various pitcher plants have of late been regarded with new interest; always noticeable for their unusual structure, and long cultivated as objects of curiosity, the investigations of Darwin and others upon the relations of plants and insects have led to new observations upon the various pitcher plants. To what is said in the article INSECTIVOROUS PLANTS in regard to *Sarracenia* it may be added that Dr. Mellichamp of South Carolina has observed that in *S. variolaris*, "not only is honey secreted in numerous drops around the inside of the mouth, but that there is actually a trail of it, when the leaf is in its fullest vigor, running down the margin of the wing to the ground, the whole forming a most effectual lure to honey-loving insects." Recent observations have shown that *Darlingtonia* is also provided with a bait to entice insects to the hidden orifice of its tube; the fish-tail-shaped appendage at the top has been found to be "smeared with honey on the inner surface." While botanists have been busy with the plants, the entomologists have studied the insects found in the pitchers of *Sarracenia*. Prof. C. V. Riley of St. Louis finds that while the dead insects found in the pitchers are numerous species of all orders, there are two which "brave the dangers of *S. variolaris*" and make their home in its leaves; one of these is a small moth, *xanthoptera semicrocea*, the larva of which makes a web just within the mouth of the tube and feeds upon its substance; the other is a flesh fly not before described, *sarcophaga sarraceniæ;* the female drops her living larvæ into the tube, to the number of a dozen or more; these feed upon the soft parts of the dead insects accumulated in the tube and upon one another, so that only one of the larvæ usually matures, the rest having fallen victims; the maggot finally makes its way through the base of the tube, burrows in the ground, and there is transformed.



Nepenthes distillatoria.

PITKIN, Timothy, an American historian, born at Farmington, Conn. Jan. 21, 1766, died in New Haven, Dec. 18, 1847. He graduated at Yale college in 1785, studied law, became a member of the state legislature, where for five sessions he was speaker of the house, and from 1806 to 1820 was a representative in congress. He published "A Statistical View of the Commerce of the United States" (New Haven, 1816; revised ed., 1835), and "Political and Civil History of the United States from 1763 to the Close of Washington's Administration" (2 vols., New Haven, 1828). He left a manuscript continuation of the latter work, bringing it down to about 1820.

PITMAN, Isaac, the inventor of phonography, born in Trowbridge, England, Jan. 4, 1813. He completed his education at the normal British school in London, and was successively principal of various schools. In 1837 he published "Stenographic Sound Hand," subsequently devoted himself to phonetic writing, founded the phonetic society in 1843, and established a printing office at Bath called the "Phonetic Institute," publishing the weekly "Phonetic Journal." He has printed several shorthand manuals, issued the Bible and many other works in phonetic type, and written "Phonography, or Writing of Sound" (1840), "Phonographic Reporter's Companion" (1853), and other works. (See PHONOGRAPHY.)

PITRA, Jean Baptiste, a French cardinal, born at Champforgueil, near Autun, Aug. 31, 1812. He studied at Autun, was ordained priest, taught rhetoric there for some time, became a member of the Benedictine congregation of Solesmes, and devoted himself to literary labors. He was repeatedly chosen prior of the monastery of Ligogé near Poitiers, visited the principal libraries of Europe, and acquired such a reputation for learning that Pius IX. called him to Rome in 1858, and gave him a special commission to compile a history of oriental rites and canon law. This obliged him to spend four years in travelling and collecting materials for his *Juris Ecclesiastici Græcorum Historia et Monumenta* (4to, Rome, vol. i., from the 1st to the 6th century, 1864; vol. ii., to the 9th century, 1868; unfinished). He was appointed a member of the ecclesiastical congregation of oriental rites in 1862, and was proclaimed cardinal March 16, 1863. He has also published *Histoire de Saint Léger, évêque d'Autun et martyr, et l'Église des Francs au 7ᵉ siècle* (Paris, 1846); *Études sur la collection des actes des saints par les RR. PP. jésuites bollandistes* (1850); *Spicilegium Solesmense* (5 vols., 1852–'60); *Vie du R. P. Libermann, fondateur de la congrégation du Saint-Cœur de Marie* (1855); and *Des canons et des collections canoniques de l'Église grecque, d'après l'édition de M. G. A. Rhalli, président de l'aréopage* (1858).

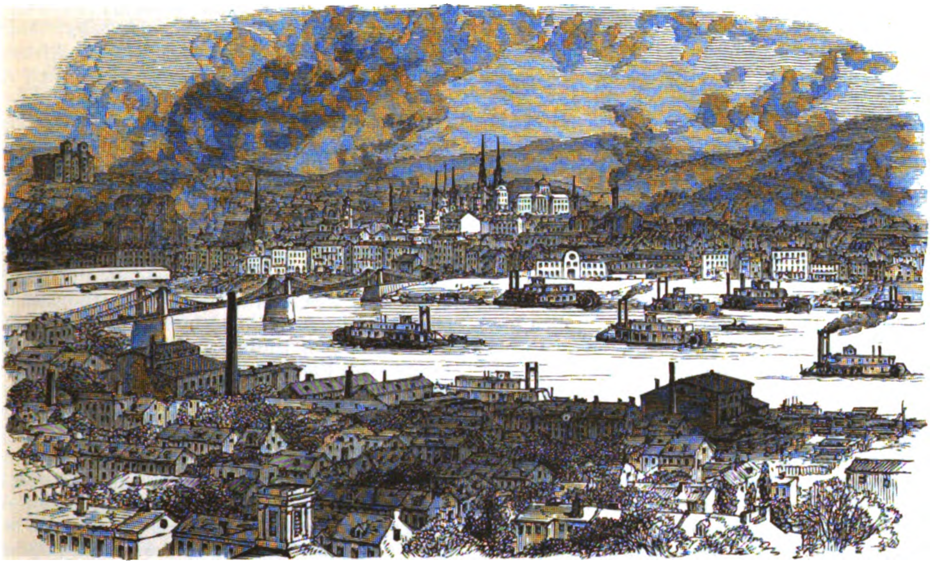
PITT, an E. county of North Carolina, intersected by Tar river; area, about 700 sq. m.; pop. in 1870, 17,276, of whom 8,414 were colored. It has a level surface and sandy soil. The chief productions in 1870 were 11,397 bushels of wheat, 498,662 of Indian corn, 71,735 of sweet potatoes, 14,456 of peas and beans, and 8,414 bales of cotton. There were 1,668 horses, 1,074 mules and asses, 2,598 milch cows, 4,712 other cattle, 2,260 sheep, and 20,298 swine. Capital, Greenville.

PITT. I. William, first earl of Chatham, an English statesmen, born at Boconnoc, Cornwall, Nov. 15, 1708, died at Hayes, Kent, May 11, 1778. He was the son of Robert Pitt of Boconnoc, and grandson of Thomas Pitt, who obtained the sobriquet of Diamond Pitt from a large gem, still celebrated as the Pitt diamond, which came into his possession in India, where he had been governor of Fort St. George at Madras, and which he sold to the regent Orleans for £135,000. William Pitt received his early education at Eton, and in 1726 entered Trinity college, Oxford, which he quitted without taking a degree. He travelled in France and Italy, and on his return obtained a commission as a cornet of dragoons. He entered the house of commons in 1735 for the family borough of Old Sarum, and made his maiden speech April 29, 1736. He soon became the most formidable opponent of the ministry of Sir Robert Walpole, who in his vexation caused the "terrible cornet of horse," as he called him, to be dismissed from the service. In the debate, in 1740, on the bill for registering seamen, he was taunted by Horatio Walpole with his youth, though he was then 32 years of age, and made his celebrated reply. He gradually obtained the reputation of being one of the most powerful, vigilant, and patriotic opponents in parliament of unconstitutional and unwise measures. The famous duchess of Marlborough left to Pitt in 1744 a legacy of £10,000, "for having defended the laws of his country and endeavored to save it from ruin;" and later Sir William Pynsent left him his whole property. In 1745 Pelham, who had become prime minister, wished to have him made secretary of war; but the king hated Pitt, and would not consent to the appointment. In 1746 he was appointed joint vice treasurer of Ireland and treasurer and paymaster of the army. He filled these offices with such integrity, refusing to accept the ordinary perquisites, which had made them in less scrupulous hands the most lucrative positions in the government, that his reputation rose to the highest pitch. In 1755 he determined to oppose certain measures of the ministry, and accordingly resigned his posts; but the popular discontent at his absence from office was so great that he was invited to enter the ministry as secretary of state. The king however continued bitterly hostile to him, and in a short time dismissed him. The public indignation at this rose to such a degree that he was restored to office in 1757, under the duke of Newcastle, with additional powers, which made him in fact prime minister. England was then engaged in the seven years' war, which had opened disastrously for her arms in almost every part of the world. Under Pitt's administration the aspect of things speedily changed. A succession of victories and conquests in America, Europe, and India filled the kingdom with rejoicing, and raised still higher the already great fame of the minister. At the same time the nation exhibited all the signs of wealth and prosperity; the merchants of London had never been more thriving, and the importance of several great commercial towns, Glasgow in particular, dates from this period. George II. died Oct. 25, 1760, and was succeeded by George III. Just at this period the French court had obtained the coöperation of Spain by a secret treaty known as the "family compact." Pitt, fully informed of the hostile intentions of Spain, insisted on declaring war against her before she had time for preparation. His colleagues in the ministry opposed this bold policy, and Pitt resigned Oct. 5, 1761. His wife was created Baroness Chatham in her own right, and a pension of £3,000 was settled on himself, Lady Chatham, and his eldest son. In 1764 he spoke against general warrants, and in 1766 he opposed the American stamp act with equal vigor. In that year he received the royal command to form a new ministry, in which he took the almost sinecure office of lord privy seal, and at the same time was created a peer with the titles of Viscount Pitt and earl of Chatham. His acceptance of a peerage very much damaged his popularity. The people had been proud of him as the "great commoner," and his elevation in rank was thought to have lowered his true dignity. On Oct. 15, 1768, he resigned the place of lord privy seal, and never afterward held any public employment. He had been from childhood tormented by the gout, which of late years afflicted him so severely that he now seldom appeared in public, but spent much of his time in bed, employing his wife as an amanuensis in his most confidential correspondence. In the intervals of pain he sometimes appeared in the house of lords to speak on questions of great importance. In 1775, '6, and '7 he opposed with energy the measures of the ministry in the American colonies, and several of his speeches on that subject are yet popular in the United States for their lofty and impassioned eloquence. His last appearance in public was on April 7, 1778, when he went from his sick bed to the house of lords to speak against a motion to acknowledge the independence of America. He appeared swathed in flannel, crutch in hand, emaciated and debilitated, and supported by his son and his son-in-law, Lord Mahon. He protested with great animation against the dismemberment of the empire and the degradation of the power of England. The house listened in solemn silence and with profound respect. At the end of his speech he fell in an apoplectic fit, and was borne home to die a few weeks afterward. His debts were paid and his family provided for by the nation, and his body was buried in Westminster abbey.—Of Chatham's writings, there have been published a small volume of letters to his nephew Thomas Pitt, Lord Camelford, and his "Correspondence" (4 vols., London, 1838–'40). His title expired with his eldest son (second earl), a general officer of unenviable notoriety, in 1835. His life has been written by the Rev. Francis Thackeray (2 vols. 4to, London, 1827). See also "Anecdotes of the Right Hon. William Pitt, Earl of Chatham, and of the principal Events of his Time, with his Speeches in Parliament, 1736–'78," by John Almon (2 vols. 4to, 1792; 4th ed., 3 vols. 8vo, 1810), and Viel-Castel, *Essai historique sur les deux Pitt* (2 vols., Paris, 1846). **II. William,** an English statesman, second son of the preceding, born at Hayes, Kent, May 28, 1759, died at Putney, Jan. 23, 1806. He was a singularly precocious child. He was tall, slender, and so sickly that he was educated at home. At the age of 14 he wrote a tragedy. Before he had completed his 15th year he was sent to Pembroke hall, Cambridge, where he was first put under the charge of a tutor named Pretyman, who afterward took the name of Tomline, and was appointed by Pitt bishop of Lincoln, a favor which his preceptor endeavored to requite by writing a life of his pupil, which has been called the worst biographical work of its size in the world. At the university he was distinguished for mathematical talent and for proficiency in classical learning. Of the languages of the continent he had no knowledge except an imperfect acquaintance with French. His father had trained him from infancy in the art of managing his voice, which was naturally clear and deep-toned, and his whole education had been directed to the point of making him a great parliamentary orator. On quitting the university he studied law in Lincoln's Inn, and at the age of 21 he became a member of parliament for the borough of Appleby. The party with which he acted was a section of the opposition composed of the old followers of his father, with the earl of Shelburne, Lord Camden, and Col. Barré at their head. His first speech, Feb. 26, 1781, was in favor of Burke's plan of economical reform, and made a great impression. In the next session he distinguished himself still more brilliantly, and on the rise to power of the Rockingham ministry he was offered the highly lucrative office of vice treasurer of Ireland. Though his income at this time was very small, he declined the offer, declaring that he would accept no post that did not give him a seat in the cabinet. Three months later, on the death of Rockingham, his successor Shelburne found that Pitt, although then but 23 years old, was the only member of his party in the house of commons who had the courage and the eloquence required to confront the great orators of the opposition. He was accordingly brought into the cabinet as chancellor of the exchequer. In the following year the Shelburne ministry resigned, and the king urgently pressed Pitt to accept the premiership. With great judgment he steadily refused, satisfied that he could not at that time form a stable administration, and the coalition ministry of Lord North and Mr. Fox was formed. Pitt took his seat on the opposition benches, and advocated a project of parliamentary reform which was rejected. Parliament reassembled in November, 1783.

The ministry brought forward a bill for the government of India, which excited the fiercest opposition and was defeated in the house of lords. The ministry resigned, and Pitt succeeded as prime minister, being appointed first lord of the treasury and chancellor of the exchequer. He took office surrounded by difficulties of the most formidable kind. Among his colleagues in the house of commons there was not a single orator of note, while the opposition was led by Fox, Burke, Sheridan, and North. His policy, however, was from the outset firm and unflinching. He maintained the contest with haughty resolution from Dec. 17, 1783, to March 8, 1784, notwithstanding he was defeated in 16 divisions. Though the house of commons was hostile, the king and the people gave him the warmest support. In the midst of the struggle the clerkship of the pells, a sinecure place worth £3,000 a year for life, and one that could be held together with a seat in parliament, became vacant. Everybody thought that Pitt, whose whole private income was only £300 a year, would appoint himself; but he gave the office to Col. Barré, who was old and blind. The courage and determination of the young premier at length triumphed. The opposition majority was reduced to one, and parliament was dissolved with the coalition of Fox and North demoralized and practically defeated. The appeal to the country met with an enthusiastic response, 160 of the coalition members losing their seats, and Pitt being returned at the head of the poll for the university of Cambridge. He was now, at the age of 25, the greatest subject that England had seen for many generations. No minister in modern times had ever been so powerful and so popular. In 1784 he secured the passage of a bill establishing a new constitution for the East India company. On March 29, 1786, in a speech of six hours, delivered without notes and without a moment's hesitation, he brought forward a scheme for the redemption of the national debt by means of a sinking fund, and supported it by a vast and elaborate array of figures and arguments. It was agreed to by the house without a single dissentient vote. The same year he negotiated a liberal commercial treaty with France. George III. becoming insane in the autumn of 1788, the opposition, with whom the prince of Wales (afterward George IV.) had affiliated, contended that the prince was as a matter of course entitled to the full powers of the crown. Pitt maintained that it belonged to parliament to determine with what degree of power the regent should be intrusted. The people sided with Pitt, and supported him with enthusiasm during a long and violent contest on the subject; and when that contest was terminated by the king's unexpected recovery, the popularity of the minister was greater than ever. At this time Pitt, who was always strongly opposed to slavery and the slave trade, carried by his eloquence and determination, against the opposition of some of his own colleagues, a bill to mitigate the horrors of the middle passage. He looked at first with approbation on the French movement for constitutional liberty, but in common with the vast majority of the English nation he was shocked and revolted by the atrocities of the revolutionists. He however labored hard to avert the war with France, but was at length forced by popular pressure and the current of events into hostilities. His military administration was feeble and unskilful. For a long series of years the operations of the English on land were marked only by inefficiency, blunders, and disasters; and on sea for a long while affairs went little better. Pitt had made his elder brother, the earl of Chatham, first lord of the admiralty, a post for which he was totally unfitted; and nothing was done by the navy till Earl Spencer succeeded him, under whose administration two great naval victories were won within a year. Yet in spite of his blunders and failures in foreign expeditions, Pitt's extraordinary genius as a parliamentary leader continued to him the absolute control of the house of commons, and at length the opposition to him there substantially vanished away. In 1799 the largest minority that could be mustered on any question was only 25 votes. Most of the leaders of the opposition had given in their adhesion to the administration, and Fox, the greatest of them all, had withdrawn from the field. In his domestic policy Pitt was vigorous and severe, and effectually repressed the revolutionary spirit in the British islands by a series of high-handed measures and arbitrary enactments which rendered him exceedingly odious to the liberal part of the people. He formed great plans however for the benefit of Ireland, but could only effect the legislative union with Great Britain, his project of Catholic emancipation being defeated by the obstinate prejudices of the king. Finding the monarch immovable on this point, Pitt resigned (March, 1801), and Addington became premier. Pitt at first made no opposition to the new ministry, and for a considerable period lived in retirement, so embarrassed in circumstances, after 18 years of absolute power, as to have serious thoughts of returning to his profession for subsistence. But when in May, 1803, the ambitious designs of Napoleon drove England to break the peace of Amiens, he appeared in parliament and made a great speech in favor of the war. In the following year the weakness of Addington and his colleagues became so apparent that the king was forced to recall Pitt to the head of affairs. He desired to form a cabinet of the first men in the kingdom, but on account of the prejudices of the king, the new government was formed chiefly of the wreck of Addington's administration, with the addition of a few personal friends of the premier, of whom Harrowby, Melville, and Canning were the most eminent. Pitt was soon beset with troubles of fearful magnitude. He was deprived by various causes of his ablest coadjutors. Harrowby fell sick, and Melville was disgraced and ejected from office for questionable pecuniary transactions. Napoleon was everywhere victorious in spite of the mighty coalitions which the skill of Pitt and the money of England formed against him. Pitt grew ill with anxiety and grief. The surrender of the Austrian army at Ulm gave him a shock from which he never fully recovered, though four days later the news of the victory of Trafalgar for a moment revived his spirits. He finally gave way on hearing of the battle of Austerlitz, and died in a few weeks. He was honored by parliament with a public funeral, and his remains were deposited near those of his father in Westminster abbey.—See "Life of William Pitt," by Earl Stanhope (4 vols., London, 1861-'2; 3d ed., 1867).

PITTACUS, one of the seven wise men of Greece, born in Mytilene in Lesbos about 652 B. C., died there in 569. He was the son of a Thracian, Hyrradius, and a Lesbian woman, and is first mentioned as engaged in a conspiracy with the brothers of the poet Alcæus, by which Melanchrus, tyrant of Mytilene, was slain about 612. About this time also he commanded the Mytileneans in a war with the Athenians for the possession of Sigeum in the Troad. Though the Mytileneans were defeated, Pittacus slew Phrynon, the leader of the enemy, an Olympic victor, whom he overcame by entangling him in a net. For his conduct he was offered great rewards, but would take only so much land as he could throw his spear over; this he set apart for religious use, and it was known to a late age as "the Pittacian land." Mytilene was soon after agitated by the conflict between several successive tyrants and the aristocratic party, the latter of which was led by Alcæus and his brother. These were at length worsted and banished, but kept Mytilene in a state of alarm by their efforts to return, so that the inhabitants finally chose Pittacus, who belonged to the democratic party, as a ruler with absolute power, under the title of *æsymnetes*, an office which differed from that of tyrant in being elective. This office Pittacus administered, apparently very wisely, from 589 to 579; but his enemies accused him of tyranny, and the lost poems of Alcæus abounded with bitter invectives against him. He enacted, among other laws, that offences committed in a state of intoxication should be visited with double penalties. The maxim, Καιρόν γνῶθι ("Know your opportunity"), is attributed to him. He was celebrated as an elegiac poet; but only a few lines of his are extant, preserved by Diogenes Laërtius.

PITTSBURGH, the second city of Pennsylvania in population and importance, county seat of Allegheny co., at the confluence of the Alleghany and Monongahela rivers, which here form the Ohio, 466 m. above Cincinnati, and 250 m. W. by N. of Philadelphia; lat. 40° 26′ 34″ N., lon. 80° 2′ 38″ W.; pop. in 1800, 1,565; in 1810, 4,768; in 1820, 7,248; in 1830, 12,542; in 1840, 21,115; in 1850, 46,601; in 1860, 49,221; in 1870, 86,076, of whom 2,015 were colored and 27,822 foreigners, including 13,119 natives of Ireland, 8,703 of Germany, 2,838 of England, 1,036 of Wales, and 584 of Scotland. There were 16,182 families and 14,224 dwellings. Of the 29,854 persons 10 years old and upward returned as engaged in occupations, 444 were employed in agriculture, 11,077 in professional and personal services, 5,963 in trade and transportation, and 12,370 in manufactures, including 2,542 iron and steel workers. The old city occupied the delta between the Alleghany and Monongahela, to which were annexed in 1872 the boroughs of Allentown, Birmingham, East Birmingham, Monongahela, Mount Washington, Ormsby, Saint Clair, South Pittsburgh, Temperanceville, Union, and West Pittsburgh, on the S. side of the Monongahela, and in 1874 the township of Wilkins, adjoining it on the east. These additions in 1870 had an aggregate population of 35,723, raising the population of the consolidated city in that year to 121,799. The population in 1875 is estimated by local authorities at 140,000, and including Allegheny City on the opposite bank of the Alleghany river and other suburbs within 5 m. of the court house, at 210,000. The land between the rivers rises toward the east to a height of from 400 to 500 ft. above the Ohio. The city is substantially and compactly built, and contains many fine residences, particularly in the E. part. A large number of the principal avenues are graded and paved. Among the public buildings are the court house, a solid stone edifice surmounted by a dome; the custom house, a commodious stone structure, which also accommodates the post office and the United States courts; the municipal hall, costing $750,000, with a massive central tower and granite front; the mercantile library, costing $250,000, containing a reading room and having 15,000 volumes; the Roman Catholic cathedral of St. Paul, an imposing edifice of brick, with two spires and a dome over the choir; St. Peter's and Trinity (Episcopal) churches; the first Baptist church; the first and third Presbyterian churches; the United States arsenal; and several large and substantial public school buildings. Allegheny cemetery is handsomely laid out.—The surrounding country abounds in coal and iron. The extent of its iron manufactures has given Pittsburgh the appellation of "iron city," while the heavy clouds of smoke that constantly hang over it, produced by burning bituminous coal in all the dwellings and manufacturing establishments, have caused it to be styled the "smoky city." Seven bridges span the Alleghany river, and five the Monongahela. Horse cars run through the principal streets and to the suburbs. The Pennsylvania, the Allegheny Valley, and the Pittsburgh, Washington, and Baltimore railroads afford direct connection with the eastern cities and with at least three fourths of the state of Pennsylvania; the Pittsburgh, Fort Wayne, and Chicago railroad and tributary lines connect the city with the west and northwest; while the Pittsburgh, Cincinnati, and St. Louis line furnishes communication with the southwest. The three rivers afford additional facilities for traffic, regular lines of steamers plying on the Ohio to Cincinnati and other points. Pittsburgh is the great shipping port for coal and coke to points on the Ohio and Mississippi rivers. The quantity of coal received in 1874 was 4,507,175 tons (equivalent to 135,215,250 bushels), of which 2,332,392 came by the Monongahela river, and 2,174,783 by rail; of coke, 1,202,337 tons (equivalent to 72,140,220 bushels), nearly all by rail. The quantity of coal and coke shipped by river was 48,621,000 bushels, viz.: to Louisville, 24,116,000 bushels; to Cincinnati, 21,004,000; to St. Louis, 1,434,000; to New Orleans, 1,300,000; to five other ports, 767,000. The receipts of produce during the same year were as follows: wheat, 594,094 bushels; barley, 397,294; rye, 131,684; oats, 1,518,994; corn, 516,104; flour, 460,013 barrels; apples, 45,923 barrels; cheese, 53,261 boxes; butter, 10,537 packages; bacon, 345,142 pieces. Pittsburgh is a port of delivery. The number of vessels belonging to the port on June 30, 1874, was 467, with an aggregate tonnage of 104,040, of which 159, tonnage 37,844, were steamers, and 308, tonnage 66,196 barges. The number built during the year ending on that date was 158, with an aggregate tonnage of 33,134, of which 23, tonnage 4,810, were steamers, and 135, tonnage 28,324, barges. The city contains 16 national banks, with an aggregate capital of $9,000,000 and deposits to the amount of more than $11,000,000, the entire resources being $32,842,551 79. The capital of the state banks amounts to $2,735,138, and the deposits to $7,594,160. There are about 20 fire insurance companies. Manufacturing is the leading interest. About one fourth of the pig iron and blooms of the United States is used by the rolling mills of Pittsburgh. There are about 16 rolling mills, and probably 150 minor iron establishments using the product of these mills for the manufacture of all sorts of steam machinery and implements for agricultural and domestic purposes. The quantity of different kinds of iron received in 1874 for the use of the rolling mills was as follows: pig, 426,718 tons; blooms and muck bar, 9,481; ore, 300,278; scrap, 19,030. The annual value of the iron manufactures is about $30,000,000. The manufacture of steel and copper has been carried on for about 20 years. There are now eight steel works, capable of producing annually more than 50,000 tons. The actual product for the past three or four years has averaged about 27,000 tons, valued at nearly $7,000,000. The annual product of the five copper manufacturing establishments is valued at about $3,000,000. The glass manufacturing establishments number about 45, producing articles of the annual value of about $11,000,000. Pittsburgh is largely identified with the production of petroleum, and contains numerous refineries. The receipts of crude oil in 1873 amounted to 2,035,182 bbls.; but owing to the financial panic they were only 1,628,070 bbls. in 1874. The shipments of refined oil to the east were 935,274 bbls. The following table contains approximate statistics of certain minor manufacturing interests:



Pittsburgh.

MANUFACTURES.	Amount of capital invested.	Annual value of products.
Ale and beer	$2,000,000	$3,500,000
White lead	1,200,000	1,500,000
Tanneries	1,500,000	1,800,000
Tobacco factories	850,000	2,000,000
Cotton and woollen factories	1,500,000	1,800,000
Chair and cabinet factories	400,000	500,000
Brass founderies	400,000	500,000
Planing mills	500,000	700,000
Potteries	150,000	150,000
Brick yards	150,000	800,000
Turning shops	200,000	400,000
Carriage factories	850,000	850,000
Distilleries	800,000	2,500,000
Wagon factories	150,000	250,000
Brush factories	40,000	75,000
Marble yards	160,000	400,000
Bellows factories	80,000	60,000
Total	$9,880,000	$16,785,000

—The city is divided into 37 wards, and is governed by a mayor, a select council of 74 members (two from each ward), and a common council of 44 members. It has a police force and an efficient fire department. Water works on a magnificent scale are in course of construction, to cost from $4,000,000 to $6,000,000. The assessed value of property is $172,000,000. The city debt amounts to about $13,000,000, and the real estate owned by the municipality is estimated to be worth about the same sum. The state supreme court for the western district meets here, and two sessions of the United States courts for the western district of Pennsylvania are held here annually. Among the principal charitable institutions are the western Pennsylvania hospital, with a department for the insane at Dixmont, on the Pittsburgh, Fort Wayne, and Chicago railroad; the city general hospital, the homœopathic hospital and dispensary, the Pittsburgh infirmary, the Pittsburgh free dispensary, the mercy hospital, the home for destitute men and young men's home, the Episcopal church home, the home for destitute women, and the Roman Catholic orphan asylum. The city is divided into 36 school districts, and the public schools are under the control of a board of education consisting of one member from each district. There are 53 school houses, and the schools are graded and include a high school. The number of teachers employed during the year ending Sept. 1, 1874, was 383 (56 male and 327 female); number of pupils enrolled, 21,009; average daily attendance, 12,873; value of school property, $1,904,500. The expenditures for the year ending June 1, 1874, amounted to $601,629 19, of which $273,895 08 was for salaries. The Pittsburgh female college (Methodist) is a flourishing institution. The western university of Pennsylvania was founded in 1819. It has a collegiate department, with classical, scientific, and engineering courses, and a preparatory department, with classical and English courses. In 1873-'4 the number of instructors was 17; of students, 252, of whom 80 were in the collegiate and 172 in the preparatory department. It has a library of about 2,500 volumes, extensive philosophical and chemical apparatus, and a cabinet containing more than 10,000 specimens in geology, conchology, mineralogy, and zoölogy. Connected with it is an astronomical observatory in Allegheny City. There are two theatres, an opera house, an academy of music, and several public halls. There are 9 daily (3 German), 1 semi-weekly, and 19 weekly (3 German and 1 Welsh) newspapers published. There are 141 churches and chapels, viz.: 4 African Methodist Episcopal, 8 Baptist, 1 Church of God, 1 Congregational, 1 Cumberland Presbyterian, 2 Disciples', 10 Episcopal, 1 Evangelical Association, 1 German Evangelical, 2 Jewish, 9 Lutheran, 6 Methodist, 21 Methodist Episcopal, 1 New Jerusalem, 16 Presbyterian, 5 Reformed, 2 Reformed Presbyterian, 34 Roman Catholic, 1 Unitarian, 11 United Presbyterian, 1 Universalist, 2 Welsh, and 1 Welsh Calvinistic.—The territory in which Pittsburgh is situated was, at the opening of the French and Indian war, claimed by the English under a charter from the crown, strengthened by a treaty with the Iroquois; and the French laid claim on the ground of discovery. In February, 1754, the English began building a stockade at the river junction, but were driven from it in April by a French force under Captain Contrecœur, who proceeded at once to erect a fort, which he called Duquesne, in honor of the governor of Canada. This fort at once became the great centre of all the military operations of the French in this part of the country, and its commanding position rendered its restoration to the English a matter of the first importance. In 1755 Gen. Braddock, at the head of the largest expedition that had ever crossed the Alleghanies, was sent to recapture it. On July 9 he was met and defeated by the French and Indians at a point on the Monongahela 10 m. above the fort. Twelve of the British soldiers taken prisoners on that occasion were burned by the savages. A force of 800 men under Major Grant was cut to pieces in a second attempt to take the fort, Oct. 15, 1758; but a third, by 6,000 men under Gen. Forbes, Nov. 25, 1758, was successful, the French, disheartened by the failure of several attacks on the advancing army, having abandoned and set fire to it on the day preceding. A new and large fort was completed about January, 1759, and was called Fort Pitt, in honor of the British minister. Several expeditions were fitted out against it by the French, but they all failed. In 1764 the first efforts were made toward building a town. In October, 1772, the post was abandoned by the English. A controversy between Pennsylvania and Virginia as to the boundary line was the subject of much negotiation, and gave rise to ill feeling between the two states, Virginia claiming the territory on which the city stands under a charter from James I., and Pennsylvania under a charter from Charles II. A company of Virginians took possession of the fort under an order from the Virginia convention, Aug. 11, 1775. On Aug. 31, 1779, commissioners appointed by the two provinces met in Baltimore, and agreed upon the boundary, which was duly ratified by their respective legislatures. During the excise troubles of 1791-'4, which culminated in the "whiskey insurrection," Pittsburgh was the scene of much violence. It was incorporated as a borough in 1804, and chartered as a city in 1816. In 1845 a conflagration destroyed the entire business quarter, consuming $5,000,000 worth of property.

PITTSBURGH LANDING, Battle of. See SHILOH.

PITTSFIELD, the shire town of Berkshire co., Massachusetts, on the Boston and Albany railroad, and at the terminus of the Housatonic and the Pittsfield and North Adams railroads, 130 m. N. N. E. of New York, and 151 m. by rail W. of Boston; pop. in 1860, 8,045; in 1870, 11,112. It is beautifully situated in an elevated valley surrounded by mountains, and is regularly laid out, with houses generally of wood and very neatly built. In the centre of the town is a green, called the park, in which is a handsome monument in memory of the citizens of Pittsfield who fell in the civil war. Around the park are several fine buildings, including the elegant white marble court house, the Congregational church of stone, the building of the Berkshire life insurance company, St. Stephen's Episcopal church, and the building of the Berkshire Athenæum, containing a fine library and collections of local curiosities. On the main street are the handsome marble church of St. Joseph (Roman Catholic) and the fine buildings and grounds of the Maplewood institute for young ladies. The jail is also a fine building. The town is extensively engaged in the manufacture of cotton and woollen goods, paper, silk, machinery, &c. It contains two national banks, with a joint capital of $700,000; a savings bank, with about $2,000,000 deposits; a high school and public schools of inferior grades, with an average attendance of about 2,000 pupils; two weekly newspapers; and nine churches.—Pittsfield was incorporated in 1761, and named in honor of William Pitt. It is soon to be organized as a city (1875). The Berkshire medical institution, founded here in 1822, was discontinued in 1869.

PITTSTON, a borough of Luzerne co., Pennsylvania, on the E. bank of the Susquehanna, just below the mouth of the Lackawanna, and on the Lackawanna and Bloomsburg, the Lehigh and Susquehanna, and the Lehigh Valley railroads, 7 m. N. E. of Wilkesbarre, 10 m. S. W. of Scranton, and 105 N. by W. of Philadelphia; pop. in 1870, 6,760; in 1875, about 15,000, including West Pittston and immediate vicinity. It is in the heart of the Wyoming anthracite region, and is the seat of the Pennsylvania coal company's operations, the shipments amounting to from 2,500,000 to 3,000,000 tons a year. It has an important trade, and the abundance and cheapness of coal give it admirable facilities for manufactures. The principal establishments are a knitting mill, a foundery and machine shop, two planing mills, pottery and terra cotta works, water works, gas works, and extensive stove works. The borough is connected with West Pittston, on the opposite bank, by two fine bridges, and has a street railroad, an opera house, three banks with an aggregate capital of $900,000, good schools, two weekly newspapers, a public library, and 12 churches, embracing nearly all denominations.

PITTSYLVANIA, a S. county of Virginia, bordering on North Carolina, bounded N. by the Staunton, intersected by the Banister through the middle, and drained by the Dan river on the south; area, about 900 sq. m.; pop. in 1870, 31,343, of whom 16,084 were colored. It has a diversified surface and fertile soil. The Richmond, Danville, and Piedmont railroad passes through it. The chief productions in 1870 were 125,359 bushels of wheat, 307,657 of Indian corn, 252,787 of oats, 20,332 of Irish and 9,145 of sweet potatoes, and 4,282,511 lbs. of tobacco. There were 2,926 horses, 1,310 mules and asses, 5,031 milch cows, 1,175 working oxen, 6,584 other cattle, 5,664 sheep, and 21,197 swine. Capital, Pittsylvania Court House.

PIURA, an inland city of Peru, capital of the department, province, and district, and on the river of the same name, 523 m. N. W. of Lima; pop. about 15,000. Situated in the midst of a sandy plain, it has pretty good streets, and houses more remarkable for solid construction than architectural symmetry. The climate is very mild and exceedingly dry, Piura being comprised within the rainless zone of the republic. Sulphur, iron, lead, magnesia, lime, and sulphate of soda abound in the province, and petroleum likewise occurs. The cultivated products comprise maize, tobacco, cacao, cotton, and the sugar cane; plantations of the two last of which are fast multiplying in the vicinity of the city, which will be connected by a railway 63 m. in length, to be completed in 1876, with its port, Payta, on the Pacific. The mules of Piura are the best in the republic.—This city, founded by Pizarro in 1531 near its present site, under the name of San Miguel, is the oldest European settlement in Peru.

PIUS, the name of nine popes, of whom the following are the most important. **I. Pius I., Saint,** born in Aquileia about the year 90, died in Rome in 157. His father's name was Rufinus, and his own surname of Pius was bestowed on him by the Christians of Rome, to whom he ministered from 117 till April 9, 142, when he was chosen to succeed St. Hyginus. During his pontificate, with the aid of Justin Martyr, he combated the errors of Valentinus and Marcion. Some authors attribute to him the first ordinance prescribing that the feast of the resurrection should be held on Sunday. The title of martyr, given him by the Latin church, is considered by some to have been bestowed on account of his unceasing struggles for the faith, while others contend that he suffered death for it. His feast is celebrated on July 11. **II. Pius II.** (ÆNEAS SYLVIUS PICCOLOMINI), born at Corsignano near Siena, Oct. 18, 1405, died in Ancona, Aug. 14, 1464. He was destined for the legal profession, but devoted himself to the ancient classics, many of whose works he transcribed himself. In 1431 he accompanied Cardinal Capranica as secretary to the council of Basel, where he as well as the cardinal sided at first with the opponents of Eugenius IV., being allowed, together with other laymen, the right of speaking and voting in the deliberations. He was at this time an earnest advocate of the supremacy of the council, maintaining that the pope "ought rather to be considered as the vicar of the church than as the vicar of Christ." He became secretary to the antipope Felix V., and was sent by him as ambassador to the emperor Frederick III. The latter was much pleased with Sylvius, offered him the post of imperial secretary, and sent him on many missions. He wrote several works in support of his master's prerogative. He was subsequently sent on a mission to Pope Eugenius; the pope forgave him and appointed him apostolic secretary. He then gave up the German employment, and was henceforth an ardent ultramontane. Nicholas V. made him bishop of Trieste in 1447, and afterward of Siena, and sent him as papal nuncio into Germany and Bohemia, where he had conferences with the Hussites, which he relates in his epistles. He recommended mild measures to reclaim the stray sheep of Bohemia, and wrote a work on the history of that country and the Hussites, in which the doctrines of the latter are set down without exaggeration. He relates the burning of John Huss and Jerome of Prague, and speaks of their fortitude as exceeding that of any of the philosophers of antiquity. In 1452 he delivered an oration in the presence of the pope, the emperor, and other German and Italian princes, and the ambassadors of other European courts, exhorting them to new efforts against the Turks, to which object, though Constantinople fell in the following year, he devoted the rest of his life. Calixtus III. made him a cardinal, and at the death of that pontiff in August, 1458, he became pope. The main efforts of his pontificate were directed toward forming a confederacy among the Christian princes for the common defence of Christendom. The Italian states were willing to join him, but France and Germany kept aloof. By a bull addressed to the universities of Paris and Cologne, Pius condemned his own writings in defence of the council of Basel, concluding with these memorable words: "Believe what I, an old man, now say to you, and not what I wrote when I was young; believe the pontiff rather than the private individual; reject Æneas Sylvius, and accept Pius II." In 1464 an armament against the Turks was directed to assemble at Ancona. Matthias Corvinus, king of Hungary, and Charles the Bold, duke of Burgundy, had pledged themselves to join it. The Venetians had promised a large fleet. Pius II. set out from Rome to give the expedition his blessing, but found it utterly unprepared, only a few galleys having made their appearance. This lapse from duty on the part of the European princes and republics broke his heart. An incomplete edition of his works was published at Basel (fol., 1551 and 1571); his historical and geographical works were published at Helmstedt in 1699 and 1707.—See Helwing, *De Pii II. Rebus Gestis* (4to, Berlin, 1825), and Voigt, *Æneas Piccolomini* (Berlin, 1859). **III. Pius IV.** (GIANANGELO DE' MEDICI), born in Milan, March 31, 1499, died in Rome, Dec. 9, 1565. He was held in high favor by several popes, and employed by Paul III. and Julius III. in the most important functions. He was created cardinal in 1549, and succeeded Paul IV., Dec. 26, 1559. He immediately caused the arrest of Cardinals Alfonso and Carlo Caraffa, nephews of his predecessor, and had them tried by a commission. Carlo was found guilty and executed, March 3, 1561; Alfonso, convicted of minor misdemeanors, was released on payment of a heavy fine. Their brother Giovanni, duke of Pagliano, and several nobles, were convicted of other crimes and beheaded. These sentences were reversed under Pius V. Pius IV. reassembled the council of Trent in 1560, and confirmed its acts, Jan. 26, 1564. He bestowed new privileges on the knights of Malta, restored the military order of St. Lazarus, and founded with Cosmo de' Medici that of St. Stephen. On Nov. 13, 1564, he published the "Confession of Faith" called by his name; and on Nov. 27, in a consistorial allocution, he censured the extravagance of the cardinals, forbade their using coaches, and withdrew from their residences the right of asylum. In 1565 he defeated a conspiracy against his person. He died hated by the Romans on account of his severity and exactions; but he enriched Rome with many religious and literary establishments. **IV. Pius V., Saint** (MICHELE GHISLIERI), born at Bosco, near Allessandria, Jan. 17, 1504, died in Rome, May 1, 1572. He became a novice in the Dominican order at 14, graduated in theology and canon law at Bologna, received priest's orders at Genoa, and taught theology at Pavia from 1527 to 1543. In the latter year he was chosen prior of the convent of Vigevano; he governed afterward the convents of Soncino and Alba, was sent to Como, Bergamo, and the Valtellina as inquisitor in 1550, to oppose the spread of the reformed doctrines, and in 1551 was called to Rome and appointed commissary general of the holy office. He was made bishop of Sutri and Nepi in 1556, cardinal in 1557, and supreme inquisitor soon afterward. During this period he is mentioned in history as Cardinal Alessandrino. In 1560 he was appointed bishop of Mondovi, and on Jan. 7, 1566, became pope mainly through the influence of St. Charles Borromeo. Early in that year he sent to Malta 3,000 men with a subsidy of 15,000 gold crowns, and appealed to France for more effective aid. He displayed untiring zeal and inflexible rigor in preventing the spread of heterodox opinions, and in enforcing the canons of reformation promulgated at Trent. He condemned the opinions of Baius of Louvain in 1567; republished the bull *In cœna Domini* in 1568; expelled the Jews from all the papal territory except Rome and Ancona in 1569; and despatched legates to every country in Europe to counteract the influence of the reformation. He enforced the rules and sentences of the inquisition throughout Italy; suppressed bull fights in Rome; compelled courtesans to leave the city; stopped the sale of indulgences; confined bishops and priests to strict residence; and allowed the cardinals to be sued for debt in the ordinary courts. The order of Umiliati, having become utterly degenerate, was suppressed. He sent the cardinal de Santa Croce and St. Francis Borgia to the courts of Spain and France to urge the formation of a league against the Turks, succeeded in uniting for this purpose the governments of Venice and Madrid, and with their fleets and his own contingent gained the victory of Lepanto, Oct. 7, 1571. He excommunicated Queen Elizabeth in 1570, and advised Philip II. to unite with the Roman Catholic party in England for her overthrow and the enthronement of Mary Stuart; and he has been charged with having commissioned an assassin to take her life. (See Ridolfi, Roberto.) Pius V., who was as severe toward himself as toward others, was beatified by Clement X., May 1, 1672, and canonized by Clement XI., May 24, 1712. His feast is celebrated on May 5. His letters were published at Antwerp in 1640. See also Agatio di Somma, *Vita di Pio Quinto* (French translation, Paris, 1672); J. B. Feuillet, *Vie du bienheureux pape Pie V.* (1674); and Falloux, *Histoire de Saint Pie V.* (2 vols., 1844; 3d ed., 1859). **V. Pius VI.** (Gianangelo Braschi), born in Cesena, Dec. 27, 1717, died in Valence, in Dauphiny, Aug. 29, 1799. He studied under the Jesuits at Cesena, obtained his degree of doctor of civil and canon law in 1735, became secretary of Cardinal Ruffo, governor of Ferrara, in 1739, and was ecclesiastical judge of the united dioceses of Ostia and Velletri from 1740 to 1753. Having saved the archives of the chancery of Velletri during an incursion of Austrian troops in 1744, he gained the favor of King Charles of Naples, soon afterward settled some serious difficulty between that prince and the court of Rome, and was made a canon of St. Peter's and chaplain to the pope. He occupied various important offices till he was created cardinal in 1773, and elected pope, Feb. 15, 1775. He applied himself at once to the work of reform in both church and state, but met with great opposition, especially from Leopold I., grand duke of Tuscany, with whom he had a serious dispute in 1777. In 1782 he went to Vienna to oppose the measures of Joseph II. against ecclesiastical authority in Austria, but failed of his object. The Jansenist synod of Pistoja, convened by Bishop Ricci in 1786, revived the disputes with Leopold; but on the accession of the grand duke to the imperial crown after the death of his brother Joseph II. (1790) a complete reconciliation was effected, both with Tuscany and Austria. Pius had effected many reforms in the financial administration of the Papal States, and published laws favorable to the progress of agriculture and home industry. He approved a plan submitted to him by Bolognini for draining the Pontine marshes, and, though thwarted in his designs, reclaimed upward of 12,000 acres. He also opened the Appian way as far as Terracina, founded several charitable institutions, opened asylums for destitute young women, and organized a system of elementary free schools. But all his plans for the good of his people and the reform of church discipline were upset by the French revolution. The property of the church in France was confiscated, and priests who refused to subscribe to the "civil constitution of the clergy" were banished or put to death. While condemning these violent proceedings, Pius VI. refused to join the coalition of European states against France; but the assassination in Rome, Jan. 13, 1793, of Basseville, a French emissary, ultimately led to the invasion of the papal territories by Bonaparte in 1796. By the treaty of Tolentino, Feb. 19, 1797, Pius was forced to surrender Avignon and the Venaissin, and the legations of Ferrara, Bologna, and the Romagna, to pay an indemnity of 31,000,000 francs, and to give up to the French some of the finest works of art in Rome. The fulfilment of these conditions brought the pope to the verge of ruin. The French stirred up revolutionary movements in Rome, and in an attempt to suppress them Gen. Duphot, an *attaché* of the French embassy, was killed by the papal troops, Dec. 28. On Feb. 10, 1798, Gen. Berthier entered Rome without opposition, and on the 15th declared a republic. On the 20th, having been allowed two days for preparation, the pope was escorted by a strong detachment of cavalry along the road to Florence. In the following year the French, having taken possession of Tuscany, ordered him to be removed to Grenoble, where he was kept for 25 days in close confinement. The victories of Suvaroff alarming the directory for the security of their captive, he was then removed to Valence and imprisoned in the citadel; and the order had been given to send him to Dijon when he died. Pius VI. was graceful in person, affable, accomplished, fond of learning and the arts, and by no means ignorant how to govern well. He enlarged the Vatican museum, caused the publication of the splendid series of engravings known as the *museo Pio Clementino*, adorned Rome with fountains and fine buildings, and attracted to his capital a number of learned men and artists from other parts of Europe.—See Ferrari, *Vita Pii VI.* (Rome, 1802); Tavanti, *Fasti del papa Pio VI.* (3 vols., Rome, 1804); Artaud de Montor, *Histoire de Pie VI.* (Paris, 1847); and Crétineau-Joly, *L'Église romaine en face de la révolution* (2 vols., Paris, 1859; 2d ed., 1863). **VI. Pius VII.** (Barnaba Luigi Chiaramonti), born in Cesena, Aug. 14, 1742, died in Rome, Aug. 20, 1823. At the age of 16 he became a Benedictine, and was afterward lecturer on philosophy and theology at Parma and Rome and abbot of Sant' Anselmo. In 1782 he was appointed bishop of Tivoli by his cousin Pius VI., and in 1785 was created cardinal and archbishop of Imola. In 1796, when Imola was incorporated with the Cisalpine republic, Cardinal Chiaramonti published an address in which he declared it to be the doctrine of the gospel that all should obey established governments, and that Christianity was compatible with every form of government. His conciliatory spirit, active charity, and saintly life helped to maintain peace among his people and won him the respect of the French. On Dec. 1, 1799, the cardinals assembled in conclave at Venice, and Chiaramonti, impoverished by his many charities, travelled thither at the expense of a friend, and was elected pope, March 14, 1800. In the following July he entered Rome, which had been evacuated by the French, and immediately after concluded a concordat with the first consul whereby Catholic worship was reëstablished in France as the state religion. In 1804 he went to Paris to crown Napoleon, passing several months there, and returning to Rome in May, 1805. The amicable relations thus apparently established were soon interrupted by the seizure by the French of the papal port of Ancona, and a demand from the emperor that his holiness should expel all Russians, Swedes, Sardinians, and Englishmen from his dominions. This the pope peremptorily declared he could not do. A long and acrimonious correspondence followed, the French meanwhile taking possession of Cività Vecchia and of all the ports on the Adriatic. The refusal of the pope to grant a divorce between Jerome Bonaparte and Miss Patterson, and a dispute concerning appointments to certain vacant sees in the kingdom of Italy, hastened a rupture. In February, 1808, a French force under Gen. Miollis took possession of Rome; in April the emperor declared diplomatic intercourse at an end, and annexed the provinces of Ancona, Macerata, Fermo, and Urbino to the kingdom of Italy; and in May, 1809, the remainder of the Roman states were incorporated with the French empire, Napoleon declaring that he "deemed it proper for the security of his empire and of his people to take back the grant of Charlemagne." The pope replied by a bull of excommunication (June, 1809). At dawn on July 6 Gen. Radet forced an entrance into the Quirinal, and conveyed the pontiff, with his friend Cardinal Pacca, to Grenoble, whence he was removed in 1811 to Savona. In June, 1812, he was taken to Fontainebleau. Here he was treated alternately with great respect and great harshness, and on Jan. 25, 1813, was persuaded, chiefly by the representations of several cardinals who were permitted to visit him, to sign a new concordat which tacitly gave up to the emperor the whole ecclesiastical states, and decided in favor of the civil power the long disputed question as to the papal veto on the appointment of bishops by the temporal authority. All the restrictions upon the freedom of his holiness were at once seemingly removed; but a little reflection showed Pius that he had been overreached, and on March 24, in a letter to the emperor, he retracted his concessions, expressing the humblest penitence for his weakness, and imploring the divine forgiveness. Napoleon took no notice of the letter, but after the disastrous campaign of Germany (1813) proposed to restore the provinces south of the Apennines if the pope would agree to a new concordat. Refusing to listen to any proposals until he had been restored to Rome, he was escorted to Italy in January, 1814; but the disturbed condition of affairs induced him to remain at Cesena until after the abdication of the emperor, when he made his entrance into Rome, May 24, in the midst of the liveliest demonstrations of popular satisfaction. For a short time during the hundred days he was again a fugitive, when his territories were invaded by Murat; but by the congress of Vienna all the states of the church, including the legations, were restored to him. The rest of his life was principally devoted to the domestic affairs of his dominions. He made great improvements in the police and courts of law, and through his minister Cardinal Consalvi did much toward the extirpation of banditti. He abolished every kind of torture, modified the powers of the inquisition, and confirmed the suppression of all feudal imposts, privileges, monopolies, and jurisdictions. He made new concordats with France and other states, reëstablished the society of Jesus (Aug. 7, 1814), and condemned the carbonari. He was modest, disinterested, and virtuous.—See Artaud de Montor, *Histoire de la vie et du pontificat du pape Pie VII.* (2 vols. 8vo, Paris, 1836); Cardinal Pacca's "Historical Memoirs," translated into English by Sir George Head (2 vols. post 8vo, London, 1850); and *Mémoires du cardinal Consalvi* (2 vols., Paris, 1864). **VII. Pius IX.** (Giovanni Maria Mastai-Ferretti), born in Sinigaglia, May 13, 1792. His father was Count Girolamo Mastai-Ferretti, gonfaloniere of Sinigaglia, and his mother was Countess Catarina Saluzzi. In 1803 he began his classical studies in the college of Volterra, suspended them in 1808 in consequence of frequent epileptic attacks, and in 1809, the malady decreasing in intensity, he received the clerical tonsure, and went to Rome to study theology. In 1810 he returned to Sinigaglia and continued his course under the direction of his maternal uncle. The French authorities in 1812 placed his name on the lists of the Italian guard which they were organizing in Milan, but his known infirmity caused him to be excused from military service. In the autumn of 1814 he attended as a layman the lectures of the Roman academy. After a short time he was encouraged to resume his clerical dress, and, the epileptic attacks recurring less frequently, he was allowed to receive minor orders. In 1818 he was chosen as companion by Monsignore (afterward Cardinal) Carlo Odescalchi, in a missionary excursion in the neighborhood of Sinigaglia. The zeal and talent he displayed in instructing the country people induced Odescalchi to recommend him to be ordained subdeacon. Being however still subject to occasional epilepsy, he applied in person to Pius VII., obtained permission to receive priest's orders in 1819, and was appointed director of the institution for the education of poor boys called Tata Giovanni. In June, 1823, he was chosen secretary to Monsignore Muzi, apostolic delegate to Chili, where he chiefly busied himself with ministering to the Indian populations of the interior. On his return to Rome in June, 1825, he was made domestic prelate to Leo XII., and in December became superintendent of the hospital of San Michele à Ripa. He was nominated archbishop of Spoleto in 1827, and created at his own expense charitable and industrial establishments like those he had governed in Rome. In 1831 he induced a body of 4,000 insurgents to give up their arms to him, obtained their pardon from the authorities, and governed for a time the provinces of Spoleto and Perugia. In 1832 he did much to alleviate the distress which followed a severe earthquake, and was made archbishop of Imola. He was created cardinal Dec. 23, 1839, and proclaimed Dec. 14, 1840. On the death of Gregory XVI., June 1, 1846, he was immediately designated by the representative men of the moderate national party as the fittest person to succeed him. Strenuous efforts were made by the French ambassador, Count Rossi, to influence in his favor the opinion of the electors before they met in conclave; and on June 16, while the Austrian cardinals, known to be unfavorable to his nomination, were still on their way to Rome, he was elected pope. One of his first acts was to consult with Count Rossi on the reforms most likely to reconcile the papal sovereignty with the claims of Italian patriotism. Immediate steps were decided upon toward a constitutional form of government, in the administration of which laymen should have a large part. Instead of nominating, as usual, a new secretary of state, he appointed a commission of six cardinals to carry on the government. On July 1 the pope submitted to them the questions of dismissing the foreign troops in his service, of granting an amnesty to all political offenders, of adopting effectual means to restore the public credit, and of reforming the entire civil and criminal codes, together with the administration and the judiciary. The majority of the council were opposed to these changes, but Pius dismissed the Swiss troops, and on July 16 granted a general amnesty. Austria, besides being offended at the haste with which the new pope had been elected, was irritated by measures which she conceived as tending to overthrow her own rule in Italy, and imperilling the liberties and existence of the church. This feeling, shared by the court of Naples and some of the minor courts of central and northern Italy, as well as by many among the pope's advisers, was intensified by the zeal with which Pius pushed forward his innovations. He appointed commissions composed of eminent Italian jurists to inquire into needed reforms; he reduced his own household expenses, abolished all pensions not granted for great public services, imposed a three years' tax on all benefices and wealthy church corporatians, reduced the taxes, chartered railroad and telegraph companies, declared Sinigaglia and Ancona free ports of entry, stimulated home manufactures, and encouraged the formation of agricultural societies. He commanded that all the waste lands between Ostia and Porto d'Anzio should be prepared to grow rice, and that the crop should be put in and gathered at the expense of the treasury, one half of the harvest being destined for the poor; and the waters of Lake Nemi were diverted for the purpose of irrigating the rice fields. He also authorized the opening of reading rooms and mechanics' clubs, founded a central normal school for the education of tradesmen, patronized scientific congresses, and provided free lodging houses for the homeless. He showed like zeal for the reform of ecclesiastical institutions, visited in disguise or at unexpected moments the monasteries, schools, hospitals, and prisons of Rome, and went about the streets on foot and without the usual guards and attendants. His avowed aim at this period was to realize by successive steps the Giobertian ideal of a confederated Italy; but as he declared from the beginning that he could yield no part of his prerogative as temporal sovereign if it would trammel his independent action in governing the church, he found himself involved in making promises or concessions the full extent of which he did not perceive. Possessed of fair abilities, and actuated by the best intentions, but untrained and inexperienced in public matters, he was suddenly called upon to solve the most complicated political problems, in the face of revolution and amid conflicting councils. On Aug. 8 he superseded the commission of six cardinals by appointing as secretary of state Cardinal Gizzi, favorably known for his liberal opinions. Meanwhile the scientific congress which met in Genoa proved to be a convention of revolutionists, who returned to their homes pledged to resist all reforms that did not favor the speedy overthrow of monarchy and ecclesiasticism. In October Mazzini published at Paris a manifesto containing the detailed programme of the vehement and systematic agitation kept up thenceforward in all the cities of Italy, aiming at nothing short of a national constituent assembly and a united Italian republic without pope or state religion. Just then riots occurred in the Papal States in consequence of a scarce harvest, and republican risings and demonstrations on the Mazzinian plan took place. In December there was a calamitous inundation of the Tiber and great suffering in Rome, especially among the Jewish population. These misfortunes were attributed by the clubs to the oppression or improvidence of priestly rule; and Massimo d'Azeglio, representing the Piedmontese party, argued in the same way. The pope continued his reforms through 1847. On March 12 he published a law relaxing the censorship of the press and granting the right of assembling in public. At the same time he encouraged the establishment of the *Contemporaneo*, a journal in the moderate liberal interest; but with this sprang up a number of extreme and violent radical papers. Meanwhile also the noisy demonstrations in favor of the pope became more frequent and formidable. The genuine enthusiasm of the Romans, following the publication of the amnesty, was now a mighty force held in control by the revolutionists. Pius IX. was heard to say that he resembled a child who, by repeating a magic formula learned from a necromancer, had evoked an evil spirit, but, having never learned the spell to lay the fiend, could no longer be rid of him. On April 19 he officially announced that he granted a *consulta* or high council composed of deputies from each province, whose functions were to be simply advisory. With the obsequies performed at Rome in May in honor of O'Connell, and the public festivities proposed to be held in June and July to commemorate the pope's election and the amnesty, came turbulent demands for administrative and political changes. There were assassinations in the Romagna, and republican risings at Faenza and Cesena. Petitions also came pouring in for the organization of a civic guard, in consequence of the threatening attitude openly assumed toward the pope by Austria. On July 6 Pius decreed the formation of a civic guard in Rome, despite the remonstrances of Cardinal Gizzi, who resigned and flatly accused him of irresolution and weakness. On the 10th he was succeeded by Cardinal Ferretti, a man of liberal temper, very moderate ability, and no experience. A rumor suddenly arose that a conspiracy, favored by Austria, had been formed to carry off the pope and establish a reign of military repression in the Papal States. For two days and nights all Rome was filled by an armed mob, in whose presence the government was utterly paralyzed. On the 17th an Austrian force occupied Ferrara; and while the entire population was arming, the pontifical government protested, and was supported by France and England. The pope, deeming this emergency a fit occasion for making the first step toward a confederation of the Italian states, sent Monsignore Corboli-Bussi to the courts of Italy to propose a customs union as a preliminary to a political league. This negotiation, favorably received in the courts of Naples and Florence, and much encouraged by Gioberti and other Piedmontese statesmen, found no favor with the king of Sardinia. It kept alive the hopes entertained by Pius IX. till the opening of the consulta, Nov. 15. His first regular ministry, composed exclusively of ecclesiastics, had been appointed in June. The consulta immediately demanded a secularized administration, the freedom of the press, the emancipation of the Jews, and the suppression of the Jesuits; and these demands were backed both by the liberal and the radical press, as well as by excited popular demonstrations. The popularity of the pope, in foreign countries at least, had suffered no decrease till then; New York in December voted him an address of grateful sympathy and encouragement. But his government was drifting, amid extreme and powerful adverse currents, toward a fatal gulf. Risings took place in the north and south of Italy toward the end of the year. Rome and the Papal States were all ablaze, and after the revolution in France in February, 1848, the ascendancy of the republican party became irresistible. No concession that the pope could possibly make would satisfy the clubs. Cardinal Ferretti had resigned on Feb. 7, and a responsible ministry was formed, partly composed of laymen, while the consulta demanded the exclusion from office of all but laymen. On March 6 the Roman municipality waited on the pope and obtained the promise of a liberal constitution, with elective chambers vested with ordinary parliamentary powers. The promise scarcely allayed the excitement of the masses led by Sterbini and Galletti, for it was known that the commission appointed to draw up the constitution contained not one lay member. When it was promulgated, March 14, this charter or "fundamental statute" was seen by all acquainted with parliamentary institutions to contain irreconcilable elements. First in order of dignity was the college of cardinals, which was irresponsible and deliberated in secret consistory; next was a council of state appointed by the pope, whose province it was to frame laws and advise the sovereign on all weighty political questions. Then came the parliament proper, formed of two chambers: the upper chamber composed of members nominated for life by the sovereign, and the chamber of deputies composed of members elected on the basis of one deputy for every constituency of 30,000 souls. In legislation the initiative belonged to the ministers, but a bill might be introduced by any deputy on the demand of ten of his colleagues. The legislative powers of the lower chamber were restricted to purely secular affairs. Ecclesiastical or mixed matters were reserved to the consistory. A few days after the promulgation of this "fundamental statute" at Rome the republic was proclaimed in Venice, and Lombardy was in full insurrection. Piedmont had declared against the Austrians, and the pope was urged by his ministers also to espouse the cause of his country and declare war. It is impossible, from the contradictory statements of the conduct of Pius IX. at this juncture, to determine exactly how far his conduct is blameworthy, if at all. Among his ministers were laymen imposed upon him by necessity, but whose counsels, especially in what concerned his relations with foreign powers or in the management of ecclesiastical affairs, he either openly rejected or secretly thwarted. He refused to declare war against Austria, but blessed his troops ere they departed for the frontier, and gave the most explicit instructions to their commander, Gen. Durando, that his action was to be purely defensive. In spite of this the Roman minister of war, Aldobrandini, wrote to Durando, March 28, to act in concert with Charles Albert. At the same time the pope urged Monsignore Corboli-Bussi to obtain from the Piedmontese government a speedy assent to the meeting in Rome of an Italian diet for the establishment of the customs union and a national confederation. Thereby the pope hoped to be able to act as mediator toward Austria, and to offer peace on the part of united Italy, on condition that Italy should be left free to govern herself. But while the Piedmontese cabinet were procrastinating, Aldobrandini instructed Corboli-Bussi to follow the headquarters of Charles Albert and negotiate a loan for defraying the expenses of the Roman contingent as a condition toward their joining his forces. At the same time permission was given to the king of Naples to march an army through the Papal States on their way to join the Lombards and Piedmontese. It is certain that in the north of Italy, in Austria, and elsewhere, these acts of the pontifical government were considered as acts of belligerency. At this juncture Count Rossi, residing in Rome in a private capacity, wrote: "The national sentiment and its ardor for war are a sword, a weapon, a mighty force; either Pius IX. must take it resolutely in hand, or the factions hostile to him will seize it, and turn it against him and against the papacy." Just then, too, the moderate editors of the *Contemporaneo* joined Gen. Durando's camp, and this journal fell into the hands of Sterbini, and became thenceforward a potent engine of the revolution. Volunteers had increased the number of the papal troops to 25,000 before the end of March. On April 25 the ministers united in beseeching the pope to speak his will about the war, affirming that to declare against it "would most seriously compromise the temporal dominion of the holy see." On April 29 the declaration was made in consistory, and was decidedly opposed to war on Austria. The ministry resigned, and the city was once more filled with arms and tumult, the civic guard siding with the mob. It was suggested to the pope, whom no threat could terrify into yielding to the popular clamor, that he should himself go to Milan, and mediate a peace founded on the liberation of Italy. He consented; but the Austrian envoy scouted the idea, and it was abandoned. Pius was now virtually a prisoner in the Quirinal, while the dwellings of the cardinals were guarded by sentries. The press and the clubs began to discuss the necessity of an immediate alliance with the Piedmontese, and the urgency of abolishing the papal rule. The allocution of April 29 had a powerful effect both in demoralizing the pope's troops and in stirring up against him the worst passions. The king of Naples seized it as a pretext to recall his army and navy. In Austria the allocution was derided as a new act of weakness; and when the pope early in May addressed a letter to the emperor of Austria beseeching him to withdraw from Italy, the letter was left unheeded at Vienna and laughed at in Rome. The pope was forced to accept a ministry in which Mamiani was premier and secretary of state for secular foreign affairs, Galletti being minister of police. Farini, who replaced Corboli-Bussi at the Piedmontese headquarters, completed the treaty conferring on the king the command of the papal troops beyond the Po. The dissension which existed between the pope and the Mamiani ministry broke out on June 4, on the opening of the new parliament. Gioberti was then vainly but earnestly laboring to secure a union of all the states of upper Italy under Charles Albert, and to promote harmony between liberals and radicals, for the purpose of inspiring both with confidence in Pius IX. On June 11 the troops of Durando surrendered Vicenza to an Austrian army of four times their number, after 36 hours of heroic fighting; and the next day the Austrian government declared to the British ambassador its resolution to conclude an armistice on the basis of the independence of the Milanese. At the first rumors of peace the Mazzinians in Rome and elsewhere raised the cry: "War for all! liberty for all, or for none!" The news of Durando's capitulation created a perfect frenzy, but the pope still maintained his pacific attitude. The ministry resigned, and Count Rossi was invited to form another, but declined. On July 16 the populace assembled at Mamiani's dwelling and gave him an ovation, amid frantic cries of "Down with the priests." On the 17th came the intelligence that an Austrian corps had again violated the papal territory at Ferrara. The pope immediately sent a note to the European courts protesting against the act. On the 19th a petition was presented to both chambers demanding the instant arming of the people; and without waiting for an answer, the multitude, joined by the civic guard, rushed for arms to the castle of Sant' Angelo. The chamber of deputies waited upon the pope on Aug. 1 with an address containing all the demands of the mob. On the 3d the Austrians, having vanquished Charles Albert at Custozza, reëntered the legations, but were driven out of Bologna by the armed citizens. The pope sent the authorities the order to "do all that is requisite to save the country and keep inviolate its sacred borders." Every effort of the pontiff to form a regular government failed till Sept. 16, when a new ministry was announced under the leadership of Rossi. At Bologna and in the provinces the name of the new premier was hailed with favor; but in Rome nothing could reconcile the clubs to a representative of constitutional monarchy and the advocate of a confederated Italy. Nevertheless, trusting to his own conscientious determination to promote rational liberty and all true progress, Rossi, who enjoyed the pope's entire confidence, set about establishing telegraph lines and railroads. He also encouraged Gioberti to make one final effort for the realization of a confederated Italy, and Antonio Rosmini was sent from Turin to Rome for this purpose. This negotiation, though broken up by the Piedmontese cabinet, caused the death of Rossi. The Roman parliament was to be reopened on Nov. 15; but the day before an assassin was chosen in the clubs to deal him his deathblow at the very door of the assembly room. On the 14th also Sterbini wrote in the *Contemporaneo:* "Rossi is commissioned to make the experiment in Rome of the Metternichs and the Guizots. . . . Amid the laughter and contempt of the people he will fall." On the 15th Rossi was assassinated at the door of the council chamber; the next day the populace, the civic guard, the gendarmerie, the troops of the line, and the Roman legion besieged the Quirinal and forced the pope, whose secretary Monsignore Palma was shot down by his side, to accept a radical ministry; and on the 24th, having meanwhile remained a prisoner in his own palace, with no control over the civil administration and little or none over ecclesiastical affairs, he escaped, disguised as a simple priest, in the carriage of the Bavarian minister, Count Spaur, to Gaëta. Here he was received with great honor. King Ferdinand and his queen immediately sailed from Naples to meet him, and persuaded him to abandon his original purpose of accepting the hospitality of Spain. Declarations of attachment and sympathy, and presents of money, were poured upon him from all quarters of the world. He immediately issued a protest against the acts of the revolutionary government, and in February, 1849, called upon the Catholic powers, particularly France, Spain, Austria, and Naples, for armed assistance. On Feb. 19 the Roman constituent assembly declared the inauguration of a republic and the deposition of the pope from his temporal authority. On April 25 a French force landed at Cività Vecchia and marched upon Rome, while the Austrians invaded the northern and the Spaniards the southern provinces. Rome capitulated July 1, and the government was intrusted to a papal commission, a consulate of state, a consulta for finances, and provincial councils. The pope reëntered Rome April 12, 1850. He declared a partial amnesty, but his progressive tendencies had been thoroughly checked, and the reactionary policy of Cardinal Antonelli, his secretary for foreign affairs, became dominant in his council. On Sept. 24 he published a brief restoring the Roman Catholic hierarchy in England, which provoked a violent outburst of popular feeling, and led to an act of parliament forbidding the Catholic bishops to assume their titles. In 1854 he invited the bishops from all parts of Christendom to meet at Rome, and with their consent formally defined the doctrine of the immaculate conception to be a dogma of the Catholic faith. The ceremony took place in St. Peter's, Dec. 8. Other important acts of his pontificate have been the conclusion of concordats with Spain (1851), Baden (1854), and Austria (1855), all of which have since been revoked or annulled, and the foundation at Rome of English and American colleges for students of theology. The pope's cherished project of an Italian confederation was revived in 1859 by the emperor Napoleon III., but Pius IX. refused to entertain it, unless the rights of the exiled Italian princes were acknowledged. In the mean time a revolution had commenced in the papal territories (see Papal States), and on July 12 and Dec. 7, 1859, Pius addressed notes to the diplomatic body, complaining of the part taken by Sardinia in these movements, and asking the assistance of foreign powers in behalf of his temporal authority. On Oct. 9 the Sardinian chargé d'affaires at Rome received his passport. On Dec. 2 the pope addressed a letter to Napoleon refusing to take part in the proposed European congress unless the emperor recognized the integrity of the Papal States as defined by the treaties of 1815. Napoleon replied by advising the surrender of the Romagna as the only possible solution of the Italian question, and the pope published, Jan. 19, 1860, an encyclical letter explaining his reasons for rejecting the emperor's advice. This was followed on March 26 by a bull of excommunication against all persons concerned in the invasion and dismemberment of his dominions, which was published with the usual formalities on the 29th. The events which have gradually deprived Pius IX. of all his territory are mentioned in the articles Italy and Papal States.—Among the ecclesiastical acts and events which distinguish the reign of Pius IX., besides those already mentioned, are, in chronological order: his reform of the great religious bodies, begun by the encyclical letter of June 17, 1847, carried on by the appointment of a commission to inquire into laxity of discipline in religious communities, and consummated by modifying the constitutions of several, so as to make the period of probation more protracted and to raise among all the standard of discipline and intellectual training; the publication, Dec. 8, 1864, of the encyclical *Quanta cura*, and the accompanying *syllabus* or catalogue of propositions condemned by him at various times (see SYLLABUS); the celebration in 1869-'70 of the first session of the council of the Vatican (see INFALLIBILITY, and VATICAN, COUNCIL OF); the creation in the United States of a vast Roman Catholic hierarchy, crowned in March, 1875, by elevating to the cardinalate the archbishop of New York; the conflict with the Russian government after 1863 in defence of the Polish Catholics, and those which took place with the German empire and the republic of Switzerland after the council of the Vatican. Pius IX. has bestowed the honors of canonization on more persons than any of his predecessors. In June, 1871, he completed the 25th year of his pontificate, and, by having reigned longer than any of his predecessors, contradicts the traditional words uttered at his coronation, *Non videbis annos Petri*, "Thou shalt not see the years of Peter," while by the loss of his temporal power verifying the words uttered on the same occasion as a piece of flax is burned before the enthroned pontiff, *Sic transit gloria mundi*, "Thus passeth the glory of the world."—See Balleydier, *Histoire de la révolution de Rome* (2 vols., Lyons, 1851); J. F. Maguire, "Rome, its Ruler and its Institutions" (London, 1859); Saint-Albin, *Pie IX.* (Paris, 1860); Legge, "Growth of the Temporal Power of the Papacy" (London, 1870), and "Pius IX., the Story of his Life" (2 vols., 1875).

PIUTE, an E. county of Utah, bordering on Colorado, and intersected by the Grand and Green rivers; area, about 6,000 sq. m.; pop. in 1870, 82. The W. part is crossed by the Wahsatch mountains, and watered by Sevier river. It is mostly sterile. Capital, Bullion.

PI-UTES. See UTES.

PIXIS, Theodor Ludwig August, a German painter, born in Kaiserslautern, July 1, 1831. He studied in Munich, and exhibited in 1855 "Coriolanus and his Mother" and "Frederick II. of Hohenstaufen and Peter de Vineis," and in 1856 "Huss taking leave of his Friends at Constance." Subsequently he spent several years in Italy, and from 1858 to 1863 he executed frescoes illustrative of the history of Charles X. and XI. of Sweden, for the Bavarian national museum. The most celebrated of his later cartoons illustrate early and modern German poetry. He has also produced a fine picture of Calvin's last conversation with Servetus in his prison at Geneva.

PIZARRO. I. Francisco, a Spanish adventurer, born in Trujillo, Estremadura, about 1471, assassinated in Lima, Peru, June 26, 1541. He was an illegitimate son of Gonzalo Pizarro, a colonel of infantry, and of Francisca Gonzales. He received little care from his parents, and in his early years was a swineherd; but he embarked with some adventurers at Seville for the new world. In 1510 he joined an expedition from Hispaniola to Uraba in Terra Firma, under Alonso de Ojeda, who on quitting the settlement in search of supplies left Pizarro in command. Afterward he was associated with Balboa in establishing the settlement at Darien, and after Balboa's death Governor Pedrarias employed him in several military expeditions. In 1515 he was sent with a small company across the isthmus to traffic with the natives, and when Panama was made the capital he established himself near the city on a tract of land which he cultivated by the labor of Indian slaves. A few years afterward he formed an association with Hernando de Luque, a priest possessed of considerable money, and with Diego de Almagro, an adventurer and soldier, and they fitted out an expedition for exploration and conquest along the southern coast. They purchased a vessel, and in November, 1524, Pizarro embarked with 100 adventurers from Panama and sailed southward, Almagro following in a smaller vessel with about 70 men. Neither voyage was successful, and after running for several hundred miles down the coast of New Granada, sustaining terrible hardships and losing several men in their attempts to penetrate the interior, both commanders returned to the isthmus with a small quantity of gold obtained from the natives. They brought intelligence of the existence of the rich empire of Peru, and after a long controversy with Pedrarias received permission to make a second attempt. For this expedition only 160 men could be mustered. Their first exploit was to plunder a small village on the river San Juan, where they got some gold, with which Almagro returned to Panama for recruits, while Pizarro established himself on the coast. Almagro returned with 80 men, but the force was insufficient for the conquest, and he again went to Panama for reënforcements, while Pizarro continued to explore the coast. Pedro de los Rios, who had succeeded Pedrarias as governor of Panama, refusing to grant any further assistance, Pizarro, after various adventures, returned to that city, and went thence to Spain to ask for aid from the crown, taking with him as vouchers several natives of Peru, a few llamas, and many gold and silver articles of Peruvian manufacture. He reached Seville early in the summer of 1528, and on landing was imprisoned for debt; but Charles V. ordered his release, and received him at court with distinguished favor. On July 26, 1529, a *capitulacion* or commission was granted to him conveying the right of discovery and conquest in Peru, with the title and rank of governor and captain general of the province, together with those of *adelantado* and *alguacil mayor* for life and a salary of 725,000 maravedis. On his part he agreed within six months to raise and equip a force of 250 men for the conquest of Peru. Accompanied by four of his brothers, Pizarro recrossed the Atlantic in January, 1530, and a year later sailed from Panama with three vessels, 180 men, and 27 horses, on his final and successful expedition against the empire of the incas. (See Peru.) A quarrel between Pizarro and Almagro, the latter complaining that Pizarro had appropriated to himself an undue share of the honors and emoluments, at length became a civil war, in which Almagro was captured and put to death (1538). The contest was continued by Diego Almagro, his son by an Indian woman. This faction attacked Pizarro in his palace and killed him in a desperate affray, in which three of their number fell beneath his sword. He left two children by a daughter of the inca Atahuallpa. His descendants, bearing the title of marquis of the conquest, are still to be found at Trujillo in Spain. Pizarro was tall, well formed, with a pleasing countenance, a soldier-like bearing, and a commanding presence. Though grasping in the acquisition of money, he was liberal in its use, and not only gave largely to his followers, but expended most of the vast treasures of which he plundered the incas in public buildings and improvements. Lima and several other cities were founded by him. He never learned to read or write, but could sign his name. He was cruel, cunning, and perfidious, and his chief merits were courage and fortitude. **II. Gonzalo**, youngest brother of the preceding by the same father but another mother, and also illegitimate, born in Trujillo about 1506, executed at Cuzco in 1548. He was an excellent marksman, horseman, draughtsman, fencer, and lancer, but was wholly uneducated except in the art of war. He was appointed governor of Quito in 1540, and led an expedition across the Andes, which resulted in the discovery of the head waters of the Amazon and the descent of that stream to the ocean by Orellana, one of his officers. After the assassination of his brother he raised an army and rebelled against the viceroy, Blasco Nuñez. He was supported by many of the colonists and royalist soldiers, drove the viceroy from Lima, and on Jan. 18, 1546, defeated him in a battle near Quito in which Nuñez was slain. This victory gave Pizarro for a while the undisputed mastery of Peru. But in 1547 he was attacked by the royal forces under Pedro de la Gasca, who was sent from Spain to suppress the rebellion. After various encounters Pizarro was deserted by some of his followers, was defeated, taken prisoner, and beheaded. **III. Hernando**, elder brother of the two preceding, born about 1465, died about 1565. He was the legitimate son of Col. Pizarro by a lady of good family, was well educated, and served in the wars in Italy under Gonsalvo de Cordova. He took an important part in the conquest of Peru, and in 1533 set out for Spain with the royal share of the booty, arriving in January, 1534. The king made him a knight of Santiago and empowered him to equip an armament at Seville. Hernando recrossed the ocean with a large and well appointed fleet, and after his arrival in Peru was appointed governor of Cuzco, which he defended for five months against a host of Indian warriors. Subsequently, in the hostilities with Almagro, he was taken prisoner, but was finally set at liberty. A few months later Almagro fell into the hands of Hernando and was put to death by his order. In 1539 Hernando went to Spain, carrying with him a great quantity of gold. He was coldly received, and, though no formal sentence was pronounced against him, was imprisoned for 20 years in the fortress of Medina del Campo, from which he was dismissed in 1560 when nearly 100 years old.

PLACENTA. See Embryology.

PLACENTIA. See Piacenza.

PLACER, a N. E. county of California, bordering on Nevada, bounded N. by Bear river, S. by the American river and its Middle fork, and intersected by the N. fork of the American and other streams; area, 1,386 sq. m.; pop. in 1870, 11,357, of whom 2,410 were Chinese. The E. part is mountainous, being crossed by the Sierra Nevada, and is well timbered. Toward the Sacramento valley on the west the surface becomes more level, and in this portion there is much arable land; but the chief wealth is in the gold mines, of which there were 43 in 1870, viz.: 21 hydraulic, 18 placer, and 4 quartz. The county is traversed by the Central Pacific railroad and its Oregon division. The chief productions in 1870 were 102,402 bushels of wheat, 57,261 of barley, 61,209 gallons of wine, 169,033 lbs. of wool, 72,125 of butter, and 6,665 tons of hay. There were 1,767 horses, 1,563 milch cows, 2,575 other cattle, 26,596 sheep, and 7,421 swine; 1 manufactory of curled hair, 4 breweries, 14 saw mills, 1 pork-packing establishment, and 8 quartz mills. Capital, Auburn.

PLACOIDS (Gr. *πλακείν*, to cover with plates), a division of cartilaginous fishes in the old system of Agassiz, including the sharks and rays, characterized by a skin covered irregularly with enamelled plates, or studded with rough osseous points sometimes furnished with little hooks, and resembling the peculiar surface of shagreen. They are among the highest of fishes, approaching reptiles, and many of them are viviparous. (See Comparative Anatomy, and Plagiostomes.)

PLAGIOSTOMES (Gr. *πλάγιος*, transverse, and *στόμα*, mouth), a suborder of cartilaginous fishes, including the sharks and rays, in some respects the most highly organized of their class. They correspond to the selachians of Cuvier, and to the placoids of Agassiz. They are few in number in the present creation, but with the ganoids (sturgeons, &c.) were by far the most abundant in past geological epochs, these two suborders being the only members of the class found below the chalk. The centre of their vertebral column is usually more or less ossified and divided into separate vertebræ, and even when it forms a continuous *chorda dorsalis* the divisions are indicated by transverse partitions; the skull is united to the spine by a joint with a conical cavity, and the former is a simple cartilaginous capsule, without sutures, having a separate cartilaginous arch which performs the office of upper jaw; the mouth is arched, very wide on the lower surface, and at some distance from the snout, which is much developed for the accommodation of the large nasal capsules; the teeth are in numerous rows, the inner coming forward to replace those worn away by use; the branchial sacs are separated, with five or more distinct openings on the sides or lower parts of the body; the gills consist of membranous folds or plane surfaces, without the pectinated arrangement of osseous fishes, and with a pseudobranchia; there is no swimming bladder; the scapular arch is detached from the head, and the ventrals are abdominal; on the upper surface of the head, behind the eyes, in most, is a pair of spiracles, communicating with the pharynx; the skin is covered with hard rough grains or scattered spines; in the arterial bulb are from two to five transverse rows of semilunar valves; the intestine has a spiral valve; the optic nerves do not decussate, but are connected by a commissure, and there is no arterial plexus between the layers of the choroid coat of the eye. The secreting reproductive organs communicate with the ureters, and end in a rudimentary process in the cloaca; the claspers are present in the males as appendages to the posterior edge of the anal fins, fissured toward the end, and communicating with a cæcal subcutaneous sac, well lubricated with mucus, and are true intromittent organs; the ovaries are smaller than in osseous fishes, and the ova very few; some genera are viviparous, others oviparous, and others ovo-viviparous.

PLAGUE (Gr. πληγή, a blow), an aggravated malignant fever, endemic in the East, and frequently epidemic. The words *pestis* and *pestilentia*, the synonymes of plague, as well as the corresponding Greek word used by the old writers, must be taken as meaning nothing more than an epidemic fever. True plague is a contagious fever characterized by an eruption of carbuncles and buboes. Formerly plague occasionally prevailed in many places of northern Europe. Before its last visitation in 1665, it invaded England, according to Sydenham, every 30 or 40 years. Marseilles suffered from it in 1720, Moscow in 1771 and 1772, and some points in the Neapolitan dominions as late as 1815 and 1816. The celebrated "black death," which ravaged all Europe in the middle of the 14th century, appears to have been the oriental plague. As in all severe epidemics of the disease, at its commencement many of the patients died before the development of the peculiar eruption; but the general occurrence of carbuncles and buboes is sufficiently authenticated. It derived its name from the gangrenous eschars formed by the carbuncles, or perhaps from the petechiæ which accompanied the disease.—A report made to the French academy (*Rapport à l'académie royale de médecine sur la peste et les quarantaines*, &c., Paris, 1846) says: "1. At present the countries where the plague still originates are in the first place Egypt, afterward Syria and the two Turkeys. It is probable, however, that the plague may be developed without importation in the regencies of Tripoli and Tunis, and in the empire of Morocco. 2. In those countries the conditions which determine and favor its development are the habitation of alluvial or marshy grounds; a hot, moist atmosphere; low, badly aired, and crowded houses; the accumulation of a great quantity of animal and vegetable matters in a state of putrefaction; a scanty and unwholesome diet; great moral and physical destitution; the negligence of the laws of public and private hygiene. 3. Sporadic plague does not seem to be transmissible. Epidemic plague is transmissible both in the localities where the plague is raging and without them. 4. It is transmitted by means of miasmata given out by the bodies of the sick; these miasmata, in close and ill ventilated places, may create centres of pestilential infection. It results from the observations made at the lazarettos for more than a year that merchandise does not transmit the plague." The period of incubation in plague seems in no case to be beyond eight days. The course of the disease varies very much in different cases. Sometimes the local symptoms first show themselves, and the fever which follows is comparatively mild; at other times the patient is rapidly overwhelmed by the violence of the constitutional disorder, and dies without the appearance of carbuncles or buboes; between these extremes, and tending to one form or the other, the disease presents every variety. In its milder forms small spots like flea bites first make their appearance, especially on the parts of the body exposed to the air; these enlarge, become dusky, and are covered by vesicles or phlyctenæ filled with a dark-colored fluid. The base of the spots is hard; it becomes black, forming a gangrenous eschar with a circumference of an inch or an inch and a half in diameter; these are the carbuncles. This process is attended with more or less fever, which as the eschar becomes detached gradually subsides. Often consequent upon the appearance of the carbuncles, glandular swellings form, commonly in the groins or armpits, more rarely in the neck. These buboes, as they are termed, occasionally disappear without suppuration; more generally after a time pus is formed, sometimes healthy, sometimes thin and sanious. Cases in which buboes appear are attended with a higher grade of fever and with profounder depression of the vital forces; headache, restlessness, chills, and vertigo are commonly present; the eyes are red and muddy, the tongue coated, the skin hot and dry; the pulse small, weak, and frequent; petechiæ are frequently present. The duration of the disease varies. In the commencement of severe epidemics cases have been related in which the patients have died within 24 hours; in most instances, however, it continues from one to two weeks. In severe epidemics the majority of the patients die, and when recovery takes place convalescence is tedious. Morbid anatomy hitherto has added nothing to our knowledge of the disease; the blood is found to be altered and fluid, but no appearances have been noted which can be deemed characteristic.—Of the treament of plague little is known. Nearly all that can be done is to make local applications to carbuncles and buboes, support the patient's strength, and place him under as favorable hygienic circumstances as possible.

PLAICE. See Flounder.

PLAINFIELD, a city of Union co., New Jersey, on the Central New Jersey railroad, 24 m. W. S. W. of New York; pop. in 1860, 8,224; in 1870, 5,095. It is beautifully laid out. Many of the residents are engaged in business in New York, and very little manufacturing is carried on. A large amount is annually expended for the support of the public school, which ranks among the first in the state. There are two national banks, a savings institution, two weekly newspapers, and nine churches.

PLANA, Giovanni Antonio Amadeo de, baron, an Italian astronomer, born in Voghera, Piedmont, Nov. 8, 1781, died in Turin, Jan. 20, 1864. He studied at the polytechnic school in Paris, and was professor of mathematics in the school of artillery at Alessandria from 1808 to 1811, when, at the instance of his uncle Lagrange, he was appointed professor of astronomy at the university of Turin, and in 1813 he became director of the new observatory in that city. He was made baron, senator, president of the academy of sciences, and associate member of the French academy, and Oriani bequeathed him 50,000 francs. In 1810 appeared his treatise *Sulla teoria dell' attrazione degli sferoidi ellittici.* The most celebrated of his numerous subsequent works, published partly in Italian and partly in French, is *Théorie du mouvement de la lune* (3 vols., Turin, 1832).

PLANARIANS, a family of worms, or annelids, belonging to the order of *turbellaria,* which includes also the nemertians. Almost all the order are aquatic, and none are parasitic; they have neither sucking disks nor hooklets, but always vibrating cilia on the integuments. The planarians are soft-bodied, jelly-like, elliptical creatures, found in fresh water and on the seashore; the skin is furnished with numerous cilia, and with cells resembling lasso cells; the intestine, whether simple or branched, never has an anal opening; the water vascular system communicates with the exterior; the nervous system consists of two ganglia, in front of the mouth, united by a cord; there are rudimentary eyes, varying in number from two to sixteen. They are generally called flat worms, to distinguish them from the more elongated nemertians. The experiments of Dugés show a remarkable power of repairing injuries, and that by partial division individuals with double heads and tails may be produced. They propagate by eggs deposited and fertilized in the water, by internal buds, or by transverse fission; the young may develop directly into animals resembling the parents, or assume a jointed, bristly annelid structure, as shown by A. Agassiz, which is gradually lost; or the larva may be totally unlike the parent, a wormlike animal separating from a part of the body wall, and the greater portion of the larva body perishing. The last case is similar to what occurs in some star fishes. Nearly allied forms develop themselves in one or the other of these ways, in the most capricious manner.

Planarian, showing the branched intestine.

PLANCHÉ, James Robinson, an English author, born in London, Feb. 27, 1796. In 1818 he produced successfully at Drury Lane theatre a burlesque entitled "Amoroso, King of Little Britain." In 1826 he travelled on the continent, publishing on his return "Lays and Legends of the Rhine" and in 1827 "Descent of the Danube." In 1828 he produced at Drury Lane his 55th and perhaps his best dramatic work, "Charles XII." He has produced more than 200 pieces for the stage, some of them being translated from the French. In 1830 he was elected a member of the society of antiquaries. In March, 1854, he was appointed rouge croix pursuivant of arms, and in 1866 Somerset herald, which office he still holds (1875). He has also published "History of British Costume" (1834); "Regal Records" (1838); "The Pursuivant of Arms, or Heraldry founded upon Truth" (1852); "King Nut-Cracker, a Fairy Tale" (1853); "Popular Fairy Tales Illustrated" (1857); "A Corner of Kent, the Parish of Ash-next-Sandwich" (1864); "Recollections and Reflections: a Professional Autobiography" (1872); "William with the Ring: a Romance in Rhyme" (1872); "The Conqueror and His Companions" (2 vols., 1874).

PLANCHE, Jean Baptiste Gustave, a French critic, born in Paris, Feb. 16, 1808, died there, Sept. 18, 1857. He was educated at the Bourbon college, and in 1831 became a contributor to the *Revue des Deux Mondes,* and assisted Balzac in editing the short-lived *Chronique de Paris.* His slovenly habits caused him to be styled the "Diogenes of literature." He went to Italy about 1841, devoted five years to studying Italian art, and after his return published essays on the Italian masters.

PLANER TREE. See Elm.

PLANET (Gr. *πλανάομαι,* to wander; *ἀστὴρ πλανήτης,* a wandering star), a name formerly used to distinguish the seven celestial bodies which seem to move from the seemingly fixed stars, and now applied to the eight primary members of the solar system, and by some astronomers to the asteroids. The planets of the ancient systems of astronomy were the sun, the moon, Mercury, Venus, Mars, Jupiter, and Saturn; and there can be no doubt that the week of seven days had its origin in this circumstance. (See WEEK.) The solar system may be divided into three distinct families: 1, the four planets, Mercury, Venus, the earth, and Mars, commonly called the terrestrial planets; 2 (in order of distance), the asteroids or minor planets; 3, the four giant planets, Jupiter, Saturn, Uranus, and Neptune. In this classification we regard the moon, and the various satellites which attend on the four major planets, as so intimately associated with the planets to which they belong as not to need separate consideration. Nevertheless, it may be questioned whether our moon ought not to be regarded as a fifth member of the innermost family of planets, seeing that she differs much less from Mercury in size than Mercury differs from the earth.—The first point to be noticed in the general survey of the sun's family is the scale of the various parts of the planetary system. It is the more necessary to dwell on this relation because in ordinary pictures of the orbits the point is overlooked. In fact, any picture professing to show the whole of the solar system must necessarily be inexact, simply because the scale suited to show properly the orbits of the four outer planets is too small to show the paths of the four inner planets; and a scale suited to these smaller orbits would be such that the paths of the outer planets could not be included within a sheet of reasonable compass. The relative distances of the eight primary planets are as follows, the earth's being taken as 1,000:

Mercury.	Venus.	Earth.	Mars.	Jupiter.	Saturn.	Uranus.	Neptune.
387	723	1,000	1,524	5,203	9,539	19,183	30,037

The distances of the asteroids range between 2,200 and 3,400 in this scale. There is a certain uniformity in the progression of these distances (omitting Neptune), which led astronomers to recognize as real the empirical law of Bode or Titius, at least until the discovery that Neptune's orbit does not correspond with the law. The law may be thus presented: Under the names of the planets in order set the number 4; then write down in succession the numbers 0, 3, 6, 12, 24, 48, and so on, setting the 0 under Mercury, the 3 under Venus, and so on. Adding the columns thus obtained, we get the following result:

Mercury.	Venus.	Earth.	Mars.	Asteroids.	Jupiter.	Saturn.	Uranus.	Neptune.
4 0	4 3	4 6	4 12	4 24	4 48	4 96	4 192	4 384
4	7	10	16	28	52	100	196	388

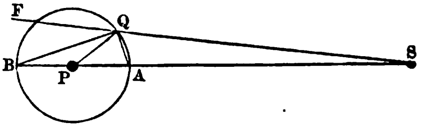
The real distances given in the former table correspond very closely with these results. Divided severally by 100, they give the series:

Mercury.	Venus.	Earth.	Mars.	Asteroids.	Jupiter.	Saturn.	Uranus.	Neptune.
3·9	7·2	10	15	22—34	52	95	192	300

The statement of the law can be simplified, if we take the orbit of Mercury as an inner limit from which to measure the distances of the several planets. These distances, so measured, form a geometrical progression, doubling as we proceed outward; only in the case of Neptune the multiplier suddenly changes from 2 to 1½. When we consider the dimensions and masses of the planets, we no longer find any uniformity of progression. The middle family or zone of asteroids is the least in point of mass; the innermost family comes next in order; and the outermost is by far the most massive. Taking the mass of the earth at 1,000, the combined mass of the outer family amounts to 419,975, that of the innermost to 2,068; and probably the combined mass of the zone of asteroids does not amount to 100 on this scale. The following table presents the relative masses of the eight primary planets, the earth's mass being taken as 1,000, and brings prominently into view the irregular distribution of matter within the solar system:

PLANETS.	Mass.	PLANETS.	Mass.
Mercury	65	Jupiter	300,860
Venus	885	Saturn	89,692
The earth and moon	1,012	Uranus	12,650
Mars	118	Neptune	16,773

To which add the sun's mass, 315,000,000, and the asteroidal family, less than 100.—A relation not commonly dealt with in treatises on astronomy may next be considered. Every orb in space bears sway, so to speak, over a certain region around it, in such sort that matter within that region is more completely under the influence of the orb's attractive power than under any other attractive influence. It would not be easy to assign a perfectly satisfactory criterion for the extent of any orb's domain in this respect, simply because the control exercised by it depends to a great degree on the velocity of the attracted matter. But as a convenient statical measure of the controlling power of each planet, we may take the attraction exerted on a body at rest at any point, as compared with the sun's attraction on a body at that point; and we may assign as the limit of a planet's domain the surface determined by the law that at any point of it the planet's attraction is exactly equal to the sun's. It is easy to determine this surface for any given planet. Thus let M be the sun's mass, D the distance of a planet, *m* the mass of the planet, which may be supposed collected at the planet's centre, so far as such an inquiry as the present is concerned. Now take a point at distance d from the centre of the planet, and on the line joining the centres of the sun and planet; then the attractions exerted by the planet and the sun on a particle placed at this point are respectively proportional to $\frac{m}{d^2}$ and $\frac{M}{(D-d)^2}$; and in order that these may be equal we must manifestly have $\frac{d}{D-d}=\frac{\sqrt{m}}{\sqrt{M}}$, or $d=\frac{\sqrt{m}}{\sqrt{M}+\sqrt{m}}.D$. Again, if d' be the distance of a point on the line joining the centres, but beyond the planet, then clearly we must have, for the attractions to be equal, the relation $d'=\frac{\sqrt{m}}{\sqrt{M}-\sqrt{m}}.D$. Hence $d+d'=\frac{2\sqrt{Mm}}{M-m}.D$; or, since m is very small compared with M, $d+d'=2\sqrt{\frac{m}{M}}.D$, very nearly. This is in reality the diameter of the spherical domain of the planet; for it is easily shown by a geometrical construction that the surface where the sun's influence and the planet's are exactly equal is a sphere. Thus let P be the planet, S the sun, Q a point where the planet's influence and the sun's are equal. Then $\frac{m}{(PQ)^2}=\frac{M}{(SQ)^2}$, or PQ : SQ :: $\sqrt{M}$: $\sqrt{m}$, a constant ratio. But QA, the bisector of the angle PQS, divides PS so that PA : AS :: PQ : QS; hence A is a point where the planet's attraction equals the sun's; and QB, the bisector of the angle PQF, divides PS produced so that BP : BS :: PQ : QS. Therefore B is another point where the planet's attraction equals the sun's. And the angle BQA is a right angle, because its parts BQP and AQP are respectively the halves of the angles FQP and SQP, which together make up two right angles. Hence Q is a point on a circle with BA as diameter, and is therefore a point on a spherical surface having BA as diameter. Also manifestly PB is the d', and PA is the d, of the above demonstration. Accordingly the radius of the planet's spherical domain is $=\sqrt{\frac{m}{M}}.D$, or varies as the square root of the planet's mass and the distance of the planet from the sun, jointly. It is easy therefore to calculate the value of this radius for the several planets. The following table presents the results as calculated by the writer, where the column of velocities is added to illustrate a relation referred to above:



PLANETS.	Radius of spherical domain.	Velocity of bodies attracted to the sun from great distances when at distance of these planets.
Mercury..................	16,077 m.	41·4 m. per second.
Venus..................	110,850 "	30·8 "
The earth and moon.....	163,880 "	25·9 "
Mars..................	85,265 "	20·3 "
Jupiter..................	14,701,000 "	11·3 "
Saturn..................	14,717,000 "	8·3 "
Uranus..................	11,114,000 "	5·9 "
Neptune..................	20,088,000 "	4·7 "

It will be noticed that the domain ascribed to the earth and moon does not really extend so far as the moon, and in making the calculation the mass of the moon should perhaps not have been added. It is easy to make the necessary correction; for the mass of earth and moon being 1,012 where earth's mass = 1,000, the square root of the mass is greater in the ratio 1,006 : 1,000, or by less than the 160th part; 162,880 represents the radius thus reduced with sufficient approximation. The mass of the moon being about the 81st part of the earth's, the moon's attraction sphere, estimated solely with reference to the sun, has a radius equal to one ninth of the earth's, or to about 18,100 m. The case is quite different with Jupiter's satellites and Saturn's, seeing that the outermost satellite of Jupiter travels at a distance of only 1,150,000 m. from the planet's centre, and the outermost of Saturn's at a distance of 2,368,000 m. from Saturn's centre, and both these distances are far less than the radius of the spherical domain of either planet. The near equality of these domains, notwithstanding the great disparity between the two planets as to their mass, illustrates the effect of distance in diminishing the energy of the sun's action. This is still more strikingly shown in the case of Neptune, whose domain enormously exceeds that of any other planet. When we consider further that matter which has been drawn sunward from interstellar space travels with a velocity proportioned to the square root of the distance from the sun, and therefore moves much more slowly at Neptune's distance than at that of any other planet, we perceive that our estimate of Neptune's relative power must be still further increased; and perhaps in such considerations as these we may find an explanation of the anomalous position of Neptune in several respects. We have seen that Bode's law is not fulfilled in his case. Moreover, the largeness of Neptune's mass compared with that of Uranus is remarkable. A certain law could have been recognized in the arrangement of the masses had the mass of Neptune been less than that of Uranus. For in the inner family of planets we perceive that the masses increase with distance from the sun to a maximum and then diminish, an explicable arrangement; and in the outer family we should have had in the case supposed a continuous decrease outward; but the decrease down to a minimum followed by increase is very difficult to interpret. In this connection we may note an empirical law which Prof. Kirkwood of Bloomington, Ind., has recognized as seemingly connecting the rotation periods of the planets with their masses and distances. It is as follows: "If through the sun a line be drawn cutting the orbits of all the planets (supposed to be projected on the invariable plane of the solar system), and the intercepts between each consecutive pair of orbits be divided in the proportion of the square roots of the masses of the corresponding planets; and if the distances between these points of division be D, D′, D″, and n be the number of sidereal revolutions which the planet makes on its axis in its periodic time, then will the following relation hold for two consecutive planets, $n^2 : n'^2 :: D^3 : D'^3$. This supposes the existence of a planet between Mars and Jupiter, corresponding to the aggregate of the asteroids, and having a mass equal to one third of the earth's." We venture to express some doubt whether the rotation periods of the planets have been determined with sufficient accuracy to support this ingenious theory. But Prof. Walker considers that Kirkwood's law may be legitimately deduced from the nebular hypothesis. The position of the axes of the several planets might be expected to indicate the existence of some law or relation resulting from the nebular hypothesis; but it is difficult to recognize any in the following table, which includes all the planets whose rotation has been accurately ascertained:

PLANETS.	Rotation period.	Inclination of equator to orbit.	Longitude of rising node of equator on orbit.
The earth......	23h. 56m. 4s.	23° 27′ 24″	180°
Mars...........	24 37 23	23 27 00	79° 15′
Jupiter.........	9 55 26	3 5 30	314°
Saturn..........	10 29 17	26 48 40	167° 4′ 5″

It is supposed that the equator of Uranus is inclined about 75° to the planet's orbit, while the axis of Neptune is so abnormally posited (if the planet's rotation corresponds with the motion of his satellites) that the inclination of his equator must be described as exceeding 160°. In other words, the inclination measured as a plane angle amounts to less than 20°, but the planet rotates from east to west instead of from west to east.—The orbital motions of the planets present certain features of uniformity; thus each of the chief planets travels in an orbit very nearly circular (though in some cases notably eccentric in position), all the planets travel the same way round, and the planes in which they travel are little inclined to the ecliptic, and (on the average) still less to the medial plane of the system. The following table presents the eccentricities (the mean distance of each planet being unity) and the inclinations of the orbits to the ecliptic, in the arrangement of which it is difficult to recognize any law in respect of magnitude:

PLANETS.	Eccentricity.	Inclination.
Mercury......................	0·205618	7° 0′ 8·2″
Venus........................	0·006833	3 23 30·8
The earth....................	0·016771	0 0 0
Mars.........................	0·093262	1 51 5·1
Jupiter......................	0·048239	1 18 40·3
Saturn.......................	0·055996	2 29 28·1
Uranus.......................	0·046578	0 46 29·9
Neptune......................	0·008720	1 46 59·0

Some of the asteroids have orbits of much greater eccentricity and inclination. Thus the eccentricity of Polyhymnia is no less than 0·339119, and the inclination of Pallas amounts to 34° 45′; so that the excursions of Polyhymnia on either side of its mean distance, and the excursions of Pallas on either side of the plane of the ecliptic, exceed when taken together the mean distance of either planet. It has been remarked that "there are few more interesting chapters in the history of astronomy than those which treat of the mathematical relations presented by the planetary eccentricities and inclinations." Seeing these elements, as we do, undergoing gradual processes of increment and decrement continuing for long periods in the same direction, astronomers were in doubt until mathematics solved the difficulty whether the planetary system was in truth stable, or whether processes might not be in action which would go on with gradually increasing effects until at length the whole system would be destroyed. Gradually the progress of analysis revealed the true interpretation of these processes, and showed them to belong, not to changes tending continually in one direction, but to oscillatory variations proceeding in orderly sequence within definite and not very wide limits. We owe to Lagrange the first enunciation of the laws relating to the stability of the solar system; but to Laplace must be ascribed the credit of establishing the important theorems which have been justly called the Magna Charta of the solar system. He proved in 1784 that in any system of bodies travelling in one direction around a central attracting orb, the eccentricities and inclinations, if small at any one time, would always continue inconsiderable. His two theorems may be thus stated: 1. If the mass of each planet be multiplied by the square of the eccentricity, and this product by the square root of the mean distance, the sum of the products thus formed will be invariable. 2. If the mass of each planet be multiplied by the square of the tangent of the orbit's inclination to the medial or fixed plane, and this product by the square root of the mean distance, the sum of the products thus formed will be invariable. Thus is the stability of the solar system secured for periods which, compared with all known units of time measurement, appear to us absolutely infinite. Every orbit will undergo continual changes of eccentricity and of inclination, now one, now another having a maximum amount of either form of apparent irregularity; but in the midst of this continual flux, the eccentricity and the inclination of the solar system regarded as a whole remain constant. Not the star sphere itself is more unchanging than the position of that circle upon it which marks the position of the well named "fixed plane" of the planetary system.

PLANE TREE, a common name for species of the genus *platanus* (Gr. πλατύς, broad), in this country called buttonwood and buttonball, and incorrectly sycamore. The genus standing alone in its family (*platanaceæ*), the characters are the same for both. The tree has a flaking bark, alternate-petioled, large, palmately nerved leaves, with sheathing stipules; the flowers are monœcious, in separate spherical heads, and without calyx or corolla; the sterile flowers consist of numerous stamens with club-shaped scales intermixed; the fertile have inversely pyramidal ovaries, also intermingled with scales, which by some are regarded as arrested stamens; the fruit is a club-shaped, one-seeded nutlet, with bristly down at the base. Only five species of *platanus* are known, all but one of which are North American. The common plane or buttonwood (*P. occidentalis*), called in England the occidental plane, extends from New England to Florida, and westward as far as the Rocky mountains, being especially abundant in the states west of the Alleghanies, and attains its greatest size in the valley of the Ohio and its tributaries. It likes a moist rich soil, in which it grows with great rapidity. It is the grandest of our deciduous trees, attaining over 100 ft. in height and a diameter of trunk of 10 to 15 ft. or more. The leaves are 5 or 6 in. long and 7 or 8 in. broad, truncate or heart-shaped at base, the margin lobed or angled; in autumn they turn pale yellow, and when they drop disclose the bud which has been concealed beneath the hollowed base of the petiole; the stipules of this tree are large, conspicuous, and leaf-like, usually united to form a sheath around the stem; the young shoots, leaves, and stipules are covered with a fine thick down, which falls off as these parts become older, and often floats in the air in such quantities as to irritate the air passages and produce a disagreeable and sometimes persistent cough in those who inhale it. The fertile heads or button-balls in this species are solitary. The branches are horizontal; the outer bark of the trunk flakes off in large patches, and sometimes entirely, exposing a surface as white as that of the white birch. As an ornamental tree its remarkably rapid growth and abundant shade are in its favor; but it is very large, and has become much disfigured by having its branches distorted by a malady attributed both to insects and to the winter-killing of the unripened wood of the previous season; and the shedding of the down already referred to makes it objectionable near dwellings. The wood is hard, firm, and close, of a reddish tint, variegated by a silver grain, but it is not much used. —The California plane tree is named *P. racemosus* by Nuttall, on account of its bearing its fertile flowers in racemes, which gives the tree a striking appearance when in fruit; the balls are strung to the number of three to five at equal distances upon a slender stalk which is 9 in. long and pendulous with their weight; the leaves are deeply divided into five, or sometimes only three lobes, and are covered upon the under side with a persistent whitish down, so close as to have the appearance of a piece of woollen cloth; the young branches, petioles, and flower stalks are also hairy.—The plane tree of ancient history, so popular with the Romans that it is said to have been nourished with wine, is *P. orientalis*, a native of various eastern countries, and much cultivated in Europe; though hardy, it is little planted in this country; it is closely related to our native plane, but its leaves are more deeply lobed, appear later in spring, and become smooth sooner, and the balls are larger. It does not make quite so large a tree as ours, but it is

American Plane Tree (Platanus occidentalis).

California Plane Tree (Platanus racemosus).

entirely free from disease. There are several varieties, one of which, var. *acerifolia*, so closely resembles *P. occidentalis* as to be sold for it in England. The wood of the oriental plane, being hard, close-grained, and capable of a fine polish, is much valued for furniture and joinery, and in the East is used in ship building. The remaining species are *P. Lindeni*, very near *P. occidentalis*, and *P. Mexicana*, which has two balls upon a peduncle 5 or 6 in. long, both natives of Mexico.—The planes may be multiplied by cuttings and by layers, but they are usually propagated from the seed.

PLANING MACHINE, a machine for planing lumber by mechanical power. One of the earliest forms, invented by Gen. Bentham of England in 1791, drove a slightly modified hand plane. A machine patented by Mr. Bramah in 1802 performed its operation by the rotation of a vertical spindle, carrying at its lower extremity a horizontal wheel, the rim of which was furnished with 28 cutters or gouges, which were followed by a plane also attached to the wheel. Thus the rough surface of the board was trimmed and left perfectly smooth as it was carried by suitable mechanism from end to end. American patents were occasionally granted for planing machines from the year 1800 to 1828, when William Woodworth of New York patented the celebrated Woodworth planing machine. This performs its operation by the use of cylindrical cutters, or cutters attached to a horizontal shaft revolving with great velocity while the board is borne along under and in contect with them by means of two or more horizontal rollers, which clamp the board on either side, the rollers being driven by mechanism communicating motion from the cylinder. Though the cylindrical machine was not originally invented by Woodworth, his claims covered such essential improvements in some of its details as to render the patented modifications invaluable, and thus gave him an almost exclusive monopoly. In 1829 Uri Emmons obtained two patents, one for cylindrical and one for circular planing machines. In 1836 Thomas E. Daniels of Worcester, Mass., greatly improved the Bramah or circular machine. The Daniels planer is usually constructed with but two cutters, and the plane of the Bramah machine is entirely dispensed with. It is still preferred for cabinet and other fine work. Many attempts were made to supersede the Woodworth machine by the use of stationary cutters, but for ordinary practical purposes the former are preferred. The patent right of the Woodworth machine was sustained by the courts during a term of 28 years, under the original patent of 14 years and two renewals of 7 years each. Numerous improvements are annually added to these machines, descriptions of which may be found in the patent office reports.

PLANT (Lat. *planta*), an organized being originating from a germ and nourished solely by inorganic substances. Although the differences between plants and animals in their higher forms are sufficiently obvious, with the lower ones it is difficult in many cases to decide whether an object ought to be classed as a plant or as an animal. Motion, which was formerly regarded as belonging only to animals, is now known to be a characteristic of some vegetable forms, and chemical constituents at one time supposed to belong only to plants have been found also in animals. Thus far it is not known that any animal can subsist directly upon the elements furnished by the mineral kingdom, while the plant is able to live upon air, water, and other inorganic materials, and assimilate them, converting them into organized structure, which may serve as food for animals; in doing this the plant takes in and decomposes carbonic acid, fixes carbon, and gives off oxygen, a function not known to belong to animals. Most animals have a stomach or internal cavity into which organized food is received; plants have no special receptacle for their food corresponding to a stomach.—*Development of the Lower Plants.* The plant in its most rudimentary form consists of a semi-fluid substance, protoplasm, surrounded by a cell wall—a minute sac or bag of protoplasm; in chemical constitution the cell wall is a carbohydrate, known as cellulose, its composition being carbon, oxygen, and hydrogen; the contents of the cell belong to the proteine compounds, and, besides the elements of cellulose, contain nitrogen. An illustration of these simple forms of plant life is found in *protococcus*, which when present in large numbers appears as a green or even red scum, or in *torula*, the yeast plant. These plants, though so simple in structure and so insignificant in size, some of them not over $\frac{1}{10,000}$ of an inch in diameter, while others are as large as $\frac{1}{3500}$ of an inch, perform the two principal functions of larger and more complex plants: they grow and reproduce themselves. Being surrounded by a liquid (in the case of *protococcus* by rain water, which contains carbonic acid, ammonia, and other matters in solution), the little plant absorbs its nourishment through the cell wall; it increases in size by assimilating its food; small as it is, it can decompose carbonic acid, appropriating the carbon and setting free the oxygen, and combining this with the other elements form cellulose and protoplasm, which incorporated with that already in the plant increases its bulk to the full size proper to the species. When growth is attained, reproduction commences; the protoplasm subdivides into two, four, eight, or more masses, around each of which a cell wall is

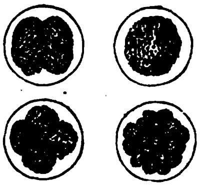


FIG. 1.—Protococcus.
Plant of a single cell, multiplying by subdivisions (magnified.)

formed, and finally the segments separate, each portion growing to the full size and repeating the operation of subdivision. Thus in a simple microscopic cell there is nutrition, growth, and reproduction. A step higher in organization are found plants of numerous simple cells placed end to end, as seen in some minute algæ and fungi, in which a similar subdivision of the cells takes place, accompanied by a growth of the parts produced by division and elongating the chain of cells. In some of these microscopic algæ the coöperation of two distinct cells is necessary to reproduction. A phenomenon called conjugation may be observed in some, such as *zygnema*, a very slender silk-like alga which forms a green scum of fine threads on pools in spring; a microscope of moderate power will show these plants to consist of elongated transparent cells placed end to end, within which the protoplasm is distinctly visible. The cells of two adjacent threads may be seen to bulge out toward one another; at length the projecting portions of the cells meet and finally touch, the cell wall between them is broken, and the contents of one cell pass over into the other, and mingling with the protoplasm of that cell form a spore, or reproductive body analogous to a seed, which being liberated starts life anew. From this simple union of two different cells to form a reproductive body, it is but a step for the plant to have special cells devoted to reproduction, while the other cells of the plant are engaged in promoting its growth. The largest plant is made up of minute cells, each of which at some stage of its existence has passed through a life similar to that described for the *protococcus*; it has been formed by the division of other cells, and has grown to its full size. —*Germination and Growth from the Seed.* A general view of plant life, as manifested in the higher forms of vegetation, may be best given by following a plant from the beginning. The first rudiment of the plant is to be found in the ovule or the forming seed. The ovule (the nature and structure of which will be explained further on) is the small pulpy body within the ovary which is to become the seed vessel, and which is itself to become the seed; a cell within the ovule is the beginning of the plant; this elongates by subdivision, and also increases in width until, taking the common bean as an example, two thick lobes are formed, connected by a short stem; when these parts are perfectly formed all growth ceases, and the seed is ripe. If we soak a ripe bean in warm water until the skin can be removed, the parts may be seen, two lobes and a small stem uniting them, which in the bean is bent; this part of the seed (and in the bean it is the whole of it besides the seed coats) is the embryo. This is formed in every seed, though often much less distinctly than in the bean, and sometimes with only one lobe instead of two. The seed is to all appearance perfectly lifeless, dry, often very hard, and even bony, and it may remain dormant for years; some have been known to germinate after being kept in the ordinary way for half a century, and even after several hundred years when deeply buried in the soil; but the stories told of seeds taken from mummies several thousand years old and germinating have no foundation in fact. The essential conditions to germination are moisture, air, and heat; these must be present in proper proportions, and are best applied through the medium of the soil, though germination will take place when these conditions are supplied in other ways. The first step is the absorption of moisture, which must be present in sufficient quantity, but for land plants there must not be an excess or the seed may rot; besides this, too much water excludes the air, without the oxygen of which germination is not possible. It was formerly supposed that darkness was essential, but experiments have shown that germination is not influenced by the presence or absence of light. The temperature required varies with different seeds; while some will germinate at a few degrees above the melting point of ice, others, seeds of tropical plants, require 100° F. or more for their most successful germination; there is a degree of heat most favorable for each kind of seeds, though they will start at a much lower and will endure a much higher temperature; thus, while Indian corn will germinate at 48° and tolerate a heat of 115°, it is found that the process goes on most rapidly at the temperature of 93°. The time required for germination, even when the conditions are most favorable, varies

FIG. 2.—Plant of Elongated Cells, placed end to end (magnified).

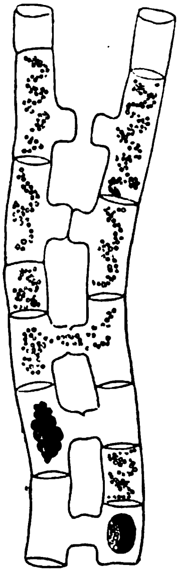


FIG. 3.—Conjugation in Zygnema (magnified).

greatly, and is of course greatly modified by temperature and other influences; some seeds sprout in 12 hours, those of most of the agricultural grains in four or five days, others require as many weeks, and there are several kinds which will lie dormant one and even two years. The time required by some seeds depends upon their treatment; if sown as soon as ripe they germinate the following spring, but if not sown until spring they remain dormant until the year following. The growth of the young plant, which the embryo may be considered as soon as germination takes place, may be followed in the bean. The embryo when liberated from the seed coats consists of two very thick and fleshy leaves, a very short stem to which they are attached, and between them some rudimentary leaves, or a bud. The two fleshy leaves, commonly known as the seed leaves, are the cotyledons, the short stem is the radicle, and the small bud the plumule; the plumule is not at first visible in all germinating seeds, but it soon manifests itself. The first step in growth is the elongation of the radicle, the cells of which multiply and grow by a similar process to that by which it grew in forming the seed; if in the soil, one end pushes downward and the other makes its way upward, carrying with it the cotyledons, which it lifts above the surface of the soil. This growth is nourished by the material within the fleshy cotyledons; in the forming and ripening of the seed the cotyledons were stored to repletion with starch and other proximate principles; these are now rendered soluble and carried to the part where growth is going on, and are there assimilated by the growing cells, where some go to build up cell walls, and others to form cell contents. These changes take place through the influence of diastase and other albuminoids, which act the part of ferments, converting starch from its fixed and insoluble condition into dextrine and sugar, forms which being soluble can be transferred. These changes are accompanied by the absorption of oxygen, the oxidation of some of the elements of the seed, and the escape of carbonic acid, and both hydrogen and nitrogen are also given off; and these changes are attended by the development of heat, which when germination takes place in a large quantity of seed, as in malting (see BREWING), becomes strikingly manifest. Before the store of nutriment in the cotyledons is exhausted preparation is made for drawing subsistence from the soil; roots, organs especially designed for absorbing liquids, make their appearance on the radicle, and through them water, holding various substances in solution, is conveyed to the interior of the plant, where this crude sap, as it is called, is converted into compounds capable of nourishing the plant. Soon after the cotyledons of the bean appear above the soil the plumule increases in size; it is lifted up upon a stem, its rudimentary leaves enlarge and expand and disclose another bud, which in turn is raised by the growth of a stem and develops its leaves, and so the growth is continued. In the bean the early leaves are in pairs, but soon only one appears at a place on the stem, and the plant elongates by a successive addition of leaves, each separated from the one below it by a portion of stem; the cotyledons, though they become green like the other leaves, and no doubt to some extent perform the functions of foliage, after a while fall away. In examining other seeds and watching their germination, while the same general plan will be found to run through all, some marked deviations from the structure as seen in the bean will be noted. In the bean the seed leaves, having been diverted from their ordinary use and made the receptacles of nourishment for the young plant, are much distorted; a condition carried still further in the pea, in which they do not appear above ground; and in the acorn, horse chestnut, and others, they are so gorged that but little resemblance is to be traced between them and ordinary leaves; on the other hand, the cotyledons will often be found thin, and though differing in shape from the leaves produced later, they remain long after germination and are equally useful with the others. In many seeds the nourishment for the growth of the young plant is placed outside of the embryo, and not within it, as in the bean; this material is termed albumen, and may be copious or scanty in proportion to the size of the embryo. The embryo is placed in the centre of the albumen, or at one end, or may be coiled in a more or less complete ring around the outside of the albumen. The embryo differs greatly in degree of development; in some cases the cotyledons are large and the plumule is distinctly visible, while in other seeds it is very rudimentary, the little stem or radicle having merely a notch at one end, the rude lobes thus formed foreshadowing the cotyledons. The name albumen is used to designate the nutritious matter placed for its nourishment outside of the embryo, without reference to its chemical composition; it was so called by the early botanists, who saw some analogy between its office and that of the white of an egg, and though endosperm, perisperm, and other distinctive names have been proposed, albumen is still used by the highest authorities. The character of the albumen varies greatly; it may be mucilaginous, fleshy, floury, oily, horny, &c. The presence or absence of albumen in seeds (albuminous and exalbuminous) is an important character in classifying plants. A still more important one is found in the number of cotyledons, which in our example, the bean, is two, that number being found in the majority of the plants in northern climates, which are dicotyledonous. Plants in which but one cotyledon is present (monocotyledonous) are throughout their whole structure very different from the others, and this difference in the embryo, accompanied by other characters, serves for the separation of flowering plants into two great classes. In the conifers and some other plants the cotyledons often appear to be more than two, but these polycotyledonous embryos are regarded as dicotyledonous with the cotyledons subdivided. To return to the bean. Even in the very rudimentary state to which we have traced it, the bean just "up," as in the common expression, has all the organs of vegetation that it needs, all in kind that it ever will have, and indeed all that any plant has. Root, stem, and leaf, being all that are concerned in the growth of the plant, its increase in size, are termed the organs of vegetation; the two last named already existed in the seed, while the root was formed as soon as germination was fairly accomplished. The future growth of the plant consists in the repetition of these organs, and though in different plants these are wonderfully varied in form and size, and are sometimes turned aside from their proper functions, they may all be traced to these three elementary organs. In the plumule there is provision for the upward growth of the plant, though in a remarkable African genus, *Welwitschia*, no upward growth takes place, the long and leathery cotyledons being all the foliage that the plant, though supposed to live upward of a century, ever produces. In all plants the leaf or leaves are produced upon the stem at a point called the node; the space between one node and the next is the internode; the plant then, no matter how long it may grow, presents a succession of leaf-bearing nodes separated by internodes—in fact, is merely a repetition of the embryo, which was a very short stem or internode with a pair of leaves. In the plumule the undeveloped leaves were upon very short undeveloped internodes, and as growth went on these internodes elongated, and grew from nourishment afforded by the cotyledons at first, and afterward from that primarily taken up by the root. The plumule is a very simple bud, but whether of this character or more highly organized, a bud (leaf bud) always consists of undeveloped leaves upon very short internodes; as the bean plant elongates there is still found at its upper end a simple bud, or what gardeners call the "growing point."—*The Root.* This may exist but a single season (annual), it may last for two seasons (biennial), or continue indefinitely (perennial). In a general way its functions are to absorb from the soil water and whatever it may hold in solution, and it also serves to fix the plant firmly to the earth. Its manner of growth will be mentioned further on; its chief office being that of absorption, it generally exposes the largest possible surface; in annual plants, where the work is to be done quickly, it is usually much subdivided and presents a mass of threads (fibrous), and these, and young roots generally, have their surface greatly increased by means of root hairs, which are prolongations like minute tubes, so small as to require a magnifier to see them, but which in the aggregate present an immense surface. If a main root descends into the soil, throwing off small branches from its sides, it is called the tap root; but its identity is often lost by its dividing into numerous small branches. These branches may be thickened at intervals (a nodose root), as in the dropwort, or be entirely fleshy, as in the tuberous root of the dahlia. In some plants, especially biennials, the root, besides performing the usual functions, is converted into a storehouse for food; the roots of agriculture, the beet, carrot, turnip, and others, afford illustrations of this. The first year of these plants is passed in accumulating nutriment in the root, which becomes very much enlarged in diameter; but if such roots are examined while growing, they will be found abundantly supplied with rootlets or small branches, to carry on the proper work of absorption. If a hardy root of this kind, like the parsnip, be left in the ground over winter, or a tender one, like the beet, be set out the next spring, the growth from them is very rapid; a strong stalk is thrown up, flowers and seed are produced, and this mainly at the expense of the food contained in the fleshy root; and it is well known that when this second growth has fairly started the roots become exhausted of their nutriment and useless as food for man or beast. Roots, whether one or several, which start from the lower end of the radicle, are primary roots; those which are produced elsewhere are secondary; many stems which trail along the ground (as squash and sweet potato) throw out secondary roots, and the propagation of plants by layering and from cuttings depends upon the ability of the stem to produce such roots. Some stems which do not touch the ground produce aërial roots; remarkable instances of this are found in the banian and the mangrove, and on a smaller scale in Indian corn, which for several joints above the soil throws out what farmers call brace roots, some of which reach the soil, while others do not; in the European ivy, the poison sumach, trumpet-creeper, and other climbers, the stem produces roots which are completely diverted from the usual office of the root and serve only to aid the plant in climbing, their main use being to attach them to the trees on which they grow, like the roots of epiphytes. —*The Stem.* The forms presented by the stem are still more numerous and varied; its proper function is to lift up the leaves to the influences of the light and air, and to keep up a communication between those organs and the root, as well as (generally) to bear the reproductive organs. The differences in duration of the stem are similar to those of the root; the great variety in size, from the mere thread-like stem of some vines to the trunks 30 ft. or more in diameter of the giant trees of California and Australia, need only be alluded to. The direction of the stem, from the prostrate form of the cucumber, through the reclining stem of the wild currant, and the twining stem of the hop, up to the erect one of the forest tree, presents a great number of modifications, all of which in descriptive botany have their technical names. Perennial stems, such as trees, are usually terminated by a bud; this preparation to continue the growth of the stem is made during summer, and when such buds are examined they are found to contain rudimentary leaves crowded upon very short undeveloped internodes; in the following spring growth from such buds is exceedingly rapid; the internodes elongate, while at the same time the minute leaves develop, and in many trees the whole growth of the season is made in a short time. The terminal buds only prolong the main stems, but most stems branch, and the branches (as a rule) proceed from buds in the axils of the leaves, or where these join the stem; as leaves are opposite or alternate, the branches are thrown off in a similar manner; but as only a small portion of the axillary buds develop, the arrangement of the branches is not so symmetrical as might be expected. In trees and shrubs the buds, both terminal and axillary, are prepared beforehand and remain dormant through the winter. In many cases the development is continuous, especially in annual stems; buds are developed as soon as formed, and we find upon such stems every gradation between the fully developed internodes, through gradually shorter ones, to a loose bud or growing point. Buds which are neither terminal nor axillary, but which appear anywhere upon the stem, are termed adventitious; some trees and shrubs produce them habitually, while others do so only when the regular buds have been destroyed. To some forms of the stem special names are given, some of which are in common use; a weak prostrate stem, like that of the strawberry, is a runner; a sucker is a branch starting upon the stem at a point below the surface of the soil; a stolon is a stem which bends over and takes root at the end; these are all taken advantage of in propagating plants. In some cases a branch is developed as a tendril to aid the plant in climbing; there are tendrils of a different nature, but a fine example of this form is afforded by the beautiful Virginia creeper, in which a slender branch has at the end of each subdivision a disk which attaches itself to a wall, after which the branch coils into a spiral. Thorns or spines are often suppressed branches, which become indurated and sharp at the point, as may be seen in a wild pear tree, the thorns, and many of the shrubs belonging to the arid western plains, where almost all vegetation seems to be on the defensive. In most of the cactus family the leaves are mere rudiments which soon fall away, and the thick, green, fleshy rind of the stem performs the functions of both leaf and stem.—These are a few of the above-ground forms of the stem, but those found below the surface are nearly as numerous and varied; much of that portion of the plant which, being found below ground, is popularly considered as the root, really consists of branches belonging to the stem. As there are creeping stems, which lie upon the surface and throw out roots at each joint or node, so there are plants with similar stems which behave in the same manner just below the surface; these stems have nodes, from which roots proceed; but having no use for leaves, these organs are represented by mere rudiments in the form of scales; they have terminal and axillary buds, and if separated from the plant are capable of living, and if they are cut into as many pieces as there are joints, each node is able to make a plant; some weeds, eminently couch grass, and some sedges in sandy soils, have underground stems of this kind, which ordinary cultivation only breaks up and subdivides, and thus multiplies rather than destroys the weed. Such an underground stem is called a rhizome or rootstock, which may be slender as in the couch grass, or very much thickened and fleshy as in the iris, bloodroot, and many others; in some the growth is very slow and definite, as in the Solomon's seal of our woods (*smilacina*), which throws up its leafy stem, and during the season matures a bud at its extremity; when the stem dies it leaves a scar on the rootstock; the bud thus formed will produce an above-ground stem the next year, another bud will be formed in advance of it, and so on, the plant gradually moving forward in this manner, while the older part of the rootstock, being no longer of use, slowly decays. Another form of the rootstock is the tuber, as the potato, which is only a very fleshy rootstock, gorged with starch to serve as nutriment for the numerous axillary buds (eyes) which it bears. In the Jerusalem artichoke the relationship between the tuber and the proper stem is more distinctly seen; it appears at the end of a much shorter stem than the potato tuber, and the scales which stand for leaves are much more prominent. Another form of underground stem is furnished in the corm, which is often called a bulb; and it is a solid bulb, or very short, more or less globular rootstock, of which among garden plants the gladiolus and crocus, and among wild plants the Indian turnip or Jack-in-the-pulpit (*arisæma*), are familiar illustrations; that these are proper stems, though much reduced, is shown by the leaf scars and axillary buds they bear; and that they are not proper roots is shown by their bearing distinct roots. The stem of the cyclamen is just like a corm, but grows above ground. The scaly bulb differs from the corm or solid bulb in being clothed with fleshy scales, which are the bases of the leaves, fleshy and thick with the nutriment stored in them by the upper portions of the leaves, which have fallen away. A longitudinal section of a scaly bulb, like that of a lily, shows the stem reduced to a mere plate, to the upper surface of which the scales are attached, and in the axils of these are a greater or less number of axillary buds; from the lower part of this reduced stem the roots are produced. The similarity between the underground stem of the scaly bulb, with its shortened internodes and fleshy scales, and that of the similarly shortened above-ground stem of a houseleek or an echeveria, bearing short fleshy leaves, is very striking. All bulbs are not scaly, some, as in the onion, having the bases of the leaves in concentric layers.—*The Leaf.* This, the remaining organ of vegetation, is described as to its various forms and its functions under Leaf. In most of the higher orders of plants the root absorbs nutriment from the soil, and the leaves digest it and prepare it for increasing the growth of the plant, and the stem serves as a medium of communication between the root and the leaves. Some of the many shapes assumed by the root and the stem are here pointed out, and those of the leaf are given elsewhere, at least a sufficient number to show that the wonderful variety presented by plants may be produced by very simple modifications of the root, stem, and leaf; and it has been suggested (of which fact careful observers will find numerous other illustrations) that these organs may perform more than one office, as the leaf may serve both as leaf and tendril, and that they may serve a purpose widely different from their ordinary one, as when roots aid the plant in climbing.—*Internal Structure.* The organs of vegetation have been treated only as to their external forms, except the leaf, which has its internal structure described in another article. (See Leaf.) When the embryo is fertilized a new cell is formed; the future growth of the embryo is due to the subdivision and multiplication of that cell; and when growth is resumed in germination, the future plant results from the multiplication of the cells contained in the embryo. The microscope shows the plant to be made up in all its parts of cells, which vary greatly in size and form, but are all regarded as modifications of the simple cell. The cell when not pressed upon by others is of a more or less spherical form, such as has been described in the simple cellular plants; it is sometimes marked by a lining which, being thin in places, gives a dotted appearance; it is sometimes nearly filled with a deposit, as in the gritty cells so common in the fruit of the pear. An aggregation of simple cells forms cellular tissue, like that found in the pulpy portions of the leaf, in young stems, in fruits, and in other soft parts of the plant; a cross section of the young stem shows the cellular tissue to be polyhedral, and the cells have their longest diameter in the direction of the growth. The walls exhibited by a cross section of cellular tissue are structurally double, and may often be separated; and frequently, where the union of contiguous cells is not complete, intercellular spaces are left. The size of the simple cell varies greatly; in the fruit of the orange family it is from one fourth to one half of an inch long, but they are ordinarily much smaller, varying from $\frac{1}{1800}$ to $\frac{1}{300}$ of an inch. The woody part of a plant shows cells of a different form; they are many times longer than wide, and are placed lengthwise parallel with the axis of the stem; their smallest diameter is from $\frac{1}{1000}$ to $\frac{1}{3000}$ of an inch, but in some cases much larger; they are tapering at the ends, and overlap one another in such a manner as to make the woody tissue they compose very strong; the term fibro-vascular is also used for this tissue. A cross section of woody tissue shows that their walls are thick and tough, though with numerous thin spaces; in old or heart wood, the cells are nearly filled with a woody incrustation; the wood cells or woody fibres in the pine family are remarkably large, and are marked by conspicuous dots, which are thin spaces in the cell wall; these are so characteristic that the wood of the pine family, even in the fossil state, may be at once recognized by the microscope. The cells of the inner bark are usually longer, finer, and tougher than those of ordinary

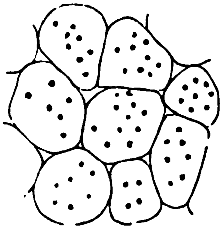


Fig. 4.—Cellular Tissue and Intercellular Spaces (magnified).

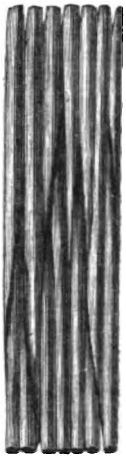
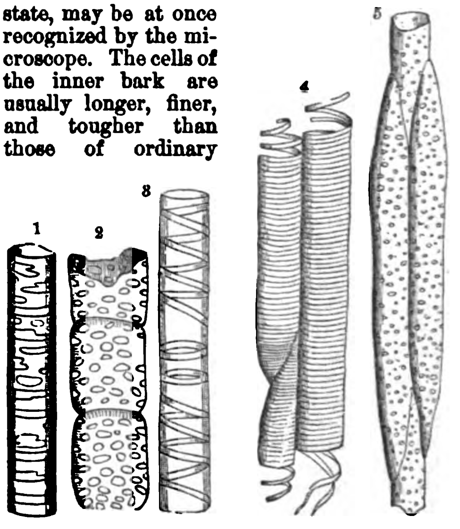


Fig. 5.—Woody Fibre and Intercellular Spaces (magnified).



Figs. 6 and 7.—Vessels and Ducts from the Stem of a Melon. 1. Reticulated. 2. Dotted. 3. Annular. 4. Spiral Vessels. 5. Dotted Fibre of Clematis (magnified).

wood, and are termed bast cells or bast fibres. The bast tissue is so developed in the linden or basswood tree that it is used for coarse fabrics; it is this that constitutes the usual fibres of the flax and hemp plants, and of others which furnish fibre in their bark. Mixed with the woody fibres, and modifications of them, are ducts or vessels, as they are sometimes called; they are much larger than the ordinary wood cells, and are often continuous tubes of considerable length, evidently formed from a row of cells placed end to end with the intervening partition obliterated; these are dotted by the appearance of thin places when young, and of pores when old; other ducts are found with the lining disposed in rings (annular ducts), and others (spiral vessels) are lined by a continuous spiral thread, which may be seen on carefully breaking a rose leaf across and gently separating the two parts. Besides these, there are milk tubes and oil tubes in plants, with special secretions, and intercellular spaces. The cell is the elementary organ of the plant, every portion of which is made up of an aggregation of cells of some kind. In the germinating seedling the stem or radicle is mainly cellular tissue, but very early there appear bundles of woody fibre, which increase in number as the stem grows upward and produces leaves.—*Growth of Dicotyledonous Stems.* In dicotyledonous plants the fibro-vascular bundles are placed to form a ring between the centre and circumference of the stem; in annual stems the woody fibre is not so strong or so abundant as in perennial stems; in the former there is often a considerable space between the bundles of wood, while in the other they are crowded and show on a cross section as a nearly complete ring separating the central portion or pith from the outer portion or bark; it will be noticed that plates of cellular tissue pass from the central pith between the bundles or wedges of wood and keep up a communication with the outer portion, or bark. A cross section of a woody stem of a dicotyledon shows in the centre the pith, then a ring of wood, and outside of this the bark, with medullary rays or lines of pith running through the wood and connecting the two; the pith is simple cellular tissue; the wood, besides proper woody fibre, contains spiral vessels and ducts, often so large as to be visible without a glass. The bark, which early in the life of the stem was simply cellular tissue covered by the epidermis, is found at the end of the season to consist of several parts; that portion next to the wood of the stem has bast cells formed in it, and becomes the inner bark or liber; outside of this is the green layer, which is much like the cellular part of leaves; this soon becomes covered by the corky layer, and to this is due the color most

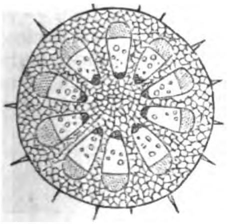


Fig. 8.—Section of Melon Stem. Bundles of Wood Fibre surrounded by Cellular Tissue.

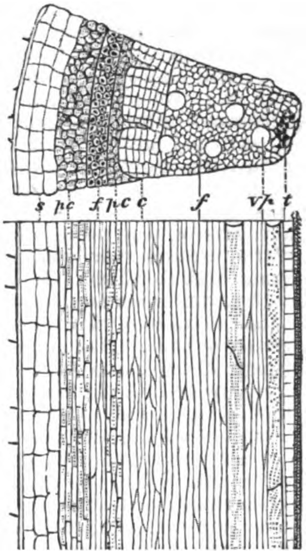


Fig. 9.—Maple Stem one year old. *s* to *c*, bark; *c* to *t*, wood; *s*, corky layer; *pc*, green layer; *f*, liber; *c*, cambium layer; *f*, woody fibre; *vp*, dotted ducts; *t*, spiral vessels.

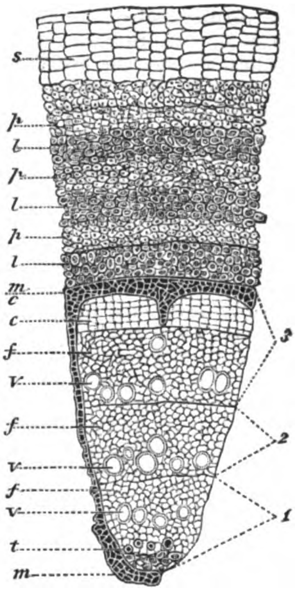


Fig. 10.—Maple Stem three years old. 1, 2, and 3, wood of first, second, and third years; *c*, cambium layer, beyond which is the bark of three years; *mc*, cellular tissue connecting by medullary rays with the pith *m*; *l*, liber. Other letters refer to the same parts as in fig. 9.

woody stems present at the end of the season; in one oak this layer becomes unusually developed, and is separated as cork, for which no substitute has as yet been found. Outside of the whole is the epidermis, a layer of thick-walled flattened cells. In a stem of this kind, when growth commences the second spring, the bark is readily separable from the wood, and between the two will be found a mucilaginous substance called the cambium; this consists of extremely delicate forming cells, as it is here that the growth of the stem takes place; the inner portion of the cambium belongs to the wood and the outer to the bark, and in this a layer of new wood forms outside of that of the previous year, while a layer of liber or inner bark is added inside of that of the year before, the medullary rays also elongating so that the wood of the second year is also traversed by these. The increase in the woody system of the stems of dicotyledons taking place always by additions on the outside of the old wood, such stems are exogenous, or outside-growing, and the term exogen is used as synonymous with dicotyledon, even when the plant is only an annual. In exogenous stems this growth goes on year after year, a layer of wood being annually added, and in the trees of temperate climates the number of these rings can be readily counted; the woody fibres first formed in the spring are larger and less dense than those formed later when vegetation is more sluggish, and this difference in texture allows the line of demarcation to be seen, when there are not, as is sometimes the case, ducts in the wood first formed. In most old stems the wood near the centre after a while becomes solidified by the incrustation of the cells, forming heart wood, which is essentially dead, as it takes no part in the growth of the tree; the newer wood in which vegetation is still active is popularly known as sap wood. While the bark receives an annual layer upon its inner surface, the outer surface undergoes marked changes; it is acted upon by the elements, and soon loses its epidermis, often the corky layer, and eventually the only part left is the liber, which gradually dies on the exterior, and is renewed on the interior; in some trees the bark falls away in flakes, in others in strips, the method of getting rid of the old bark varying greatly in different species. In a very old exogenous tree the only living portions are the buds which continue the growth and from which foliage is developed, the fresh portions of the roots, and the new layers of wood and bark, with the intervening cambium which connects the roots with the buds; examples of hollow trees are not rare in which all the remaining portion of the stem has been removed by decay. The internal structure of the root is similar to that of the stem; its chief increase is by lengthening, and this takes place much more rapidly at the tip than elsewhere, or rather a very short distance back of the tip, the very point being a sort of cap or cushion of dead cells which serves to protect the living point as it pushes its way through the soil; in some plants this root cap is very distinct. It was formerly supposed that the root was furnished with special absorbing organs, which were called spongioles, a term still sometimes used, though it was long ago shown that such organs have no existence, and that the root absorbs anywhere through its recently formed parts. The root differs from the stem in branching irregularly and in usually bearing no buds, though under certain conditions it will, like other parts of the plant, form adventitious buds; and many plants difficult to multiply otherwise are propagated by root cuttings, which when separated from the main plant will produce buds.—*Monocotyledonous Stems.* In the stem of monocotyledons a cross section shows no distinct ring of wood, and no separation into pith, wood, and bark, but bundles of woody fibre are irregularly scattered all through the cellular tissue or pith, though less numerous in the centre than at the circumference of the stem; these bundles have their origin in the leaves, and as new leaves are developed new bundles push their way down through the central portion of the stem, in young plants reaching the roots, but in older ones finally curving outward and losing themselves in the rind. In these stems the newly formed wood is deposited within the older bundles, and they are called endogenous, or inside-growing, endogen being synonymous with monocotyledon. The internal structure of a stem of this kind is shown in the article Palm; and the corn stalk illustrates that of an annual endogenous stem, which when young has an epidermis, but no separable bark. Each one of its fibrous bundles contains all the elements of the exogenous stem; a microscopic examination of such a bundle shows bast cells, wood cells, ducts of various kinds, and a portion in which all the growth of the bundle is carried on, corresponding to

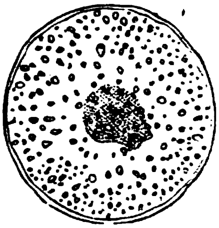


Fig. 11.—Section of a Monocotyledonous Stem (Indian Corn).

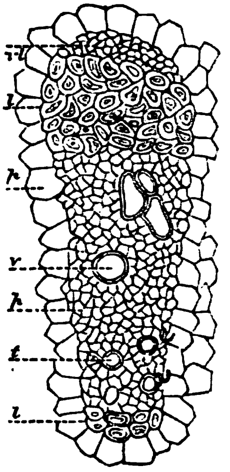


Fig. 12.—Bundle of Fibres from the above, containing the same parts as a dicotyledonous stem. (See fig. 10.)

the cambium in dicotyledonous stems.—*Epidermal Tissue.* The epidermis has been mentioned as clothing stems of both kinds when young, and indeed it covers all parts of the plant exposed to the air, save the stigma, in which the naked cellular tissue is exposed, but usually covered by a viscid secretion; the general structure of the epidermis is illustrated under Leaf, where it is shown to be a layer of flattened empty cells with numerous openings (*stomata*), or breathing pores; in some cases this has a deposit of silex and is very hard; in others it is covered with a waxy secretion, as in the bloom of the grape and other fruit, and in the leaves of the cabbage. In some cases the exposed cell wall is developed as a cuticle above the proper epidermis. The cells of the epidermis are sometimes in flowers prolonged into papillæ, which give a peculiar velvety appearance; again they are produced as simple hairs, or several cells may unite to form a hair, which may be still more complicated as a sting to exude an irritating fluid; glands and prickles often belong to the epidermis. Upon the root the epidermis is very thin, and is not upon the tender growing point, but is formed later by the thickening of the exterior cells. —*Physiology of Plants.* In the simple plants mentioned at the beginning, one cell performs all the functions of growth and reproduction; whatever part of a higher plant be examined, the cell in some form will be found, and growth wherever it takes place in the plant consists in the multiplying of cells. The cell, whether in the soft pith, the hard wood, or the remarkably strong tissue of the inner bark, without reference to its contents, is chemically the same. The ultimate composition of the cell itself is carbon, hydrogen, and oxygen ($C_{12}H_{20}O_{10}$), and is called cellulose; it has the same composition in all plants. For the formation of cellulose these elements must be supplied to the plant; they are not converted directly into cellulose, though this is their ultimate destination, but into dextrine, sugar, gum, and similar principles, either identical in composition with cellulose, or differing from it only in having a few equivalents of oxygen and hydrogen more, or cellulose with the addition of water; all these principles, including cellulose, being essentially carbon and water, are termed carbohydrates. Water is supplied by the soil; carbon is furnished in the form of carbonic acid (CO_2), which is constantly present in the atmosphere in the gaseous form, and in the water of the soil in solution. The decomposition of carbonic acid, setting free its oxygen and combining its carbon with the elements of water, is the striking phenomenon attendant upon plant growth. This change is effected only through the agency of chlorophyl (leaf green), and in the leaves or those parts capable of performing the functions of the leaf; as its name implies, chlorophyl is usually green, but it is sometimes of another color. Giving the green color to leaves, one would suppose it to be present in very large quantities, but an examination of the cells of a leaf by the microscope shows the proportion to be surprisingly small; it is seen in the form of exceedingly minute grains, attached to the walls of the cell or distributed through its contents. It has been stated that the foundation of the cell is protoplasm, and that the cell wall is built over that; protoplasm, also called the formative layer, is found in all cells of the growing parts of the plant; and chlorophyl grains are formed in it and belong in it. Protoplasm, so essential to the growth of the cell, differs from it in chemical composition, as it contains nitrogen in addition to the elements before mentioned. Other vegetable principles have a similar composition, often with the addition of sulphur and phosphorus, and are called, from their resemblance to albumen, albuminoids. To form these the plant must be supplied with nitrogen, and although this is present in the atmosphere in such abundance, the most careful experiments fail to show that the plant appropriates it. It enters the plant in combination as nitric acid in the form of nitrates and as ammonia, these being in solution in the soil. These elements, carbon, oxygen, hydrogen, and nitrogen, when the plant is burned or decays, entering into new combinations, disappear in the gaseous form, and hence are termed the volatile elements; but there is left behind the ash, or non-volatile portion, the source of which must have been the soil. It was formerly supposed that the presence of non-volatile or earthy matters in plants was accidental; being dissolved in the water of the soil, they were carried into the plant and there deposited. While more of these than is useful may be taken up, and some are of no known use, it is now well established that others are absolutely necessary; it is sufficient to say here that potash, lime, iron, phosphoric acid, and some others play an important part in vegetation, promoting the activity of growth, aiding in the diffusion of albuminoids, and in other ways; it is also ascertained that chlorophyl, upon which so much of the work of the plant depends, is not formed in the protoplasm unless iron be present, though an infinitesimally small quantity is required. These are the essential constituents of plants, furnished in part by the atmosphere, and in part by the soil. The volatile elements of plants may be regarded as coming primarily from the atmosphere, though in good part immediately obtained from the decay of former vegetation; and the vegetable products which cover the earth in the living state, or partially decayed in the soil as humus, or elsewhere as coal, peat, and muck, together represent the amount of materials that plants have taken from the atmosphere.—The conversion of the inorganic, lifeless elements into organized matter and structure endowed with life (assimilation) is done in the leaf, and a reference to its structure (see Leaf) shows how well it is adapted to the work; it is so formed as to present the greatest amount of surface to the sun and air, and in its interior structure it is mostly loose cellular tissue with abundant air spaces, which communicate with the external air through innumerable openings (*stomata*) in the otherwise impervious epidermis. A similar structure is found in other parts which act the same as leaves; in many cacti and euphorbias the whole leaf work is done by the green stem, and the young stems of other plants do the same, as do the calyx and some other parts homologous with leaves, such as the developing fruit. The roots absorb from the soil water containing in solution the ash ingredients or mineral substances, nitrogenous and other matters, which (without here noticing the means) is carried into the plant and ultimately to the leaves; this crude sap, as it is called, does not, as many suppose, move upward in distinct currents through regular channels directly to the leaves to be elaborated, and afterward descend by other channels to contribute to the growth of the plant. There is however an abundant motion of the juices of the plant, and this takes place in any direction required. As soon as the liquid taken up by the soil enters the plant, it meets with elaborated sap in the cells, and in all parts of the plant is a complex liquid. The leaves gather carbonic acid gas from the air; this is decomposed within them, and an equivalent quantity of oxygen is returned to the atmosphere; this decomposition of carbonic acid, which in the laboratory can be done only with difficulty, is effected in the delicate tissues of the leaf, but only in direct sunlight; from the carbon thus obtained and the elements of water carbohydrates are formed; this process takes place apparently within the chlorophyl cells, and in some manner requires the aid of the ash ingredients of the sap. To form albuminoids the nitrates and other nitrogenous compounds taken up from the soil furnish the needed additional element. The successive steps in assimilation are not known with certainty, as this wonderful chemistry is carried on within the recesses of the leaf, but the general fact of the decomposition of carbonic acid is well established by experiment. The interesting relations between plants and animals cannot be discussed, but it may be stated in passing that all the food of animals is provided directly or indirectly by plants, and that in preparing food for animals plants take from the air carbonic acid, destructive to animal life, and return to it oxygen, essential to the respiration of all animals; and that animals on their part return a large portion of the plants they consume as food to the air in the form of carbonic acid; thus these two great divisions of the organic world, plants and animals, reciprocally act upon the atmosphere, each contributing to the welfare and supplying the wants of the other. The form in which assimilated matter first appears within the plant is probably that of dextrine and glucose or grape sugar, principles readily changed into other soluble carbohydrates or into the insoluble form of cellulose. Another important carbohydrate is starch, like cellulose insoluble, and the form in which assimilated material is kept in reserve; it is readily converted into any of the soluble carbohydrates, and ultimately into cellulose; hence we find it wherever nutriment is provided for future growth; it constitutes in some form a large part of most seeds, and is stored near buds, notably in tubers and fleshy roots, to supply the demands of the growth of young shoots. The growth of the plant from reserve material has been already noted in describing germination; the phenomenon is shown in a striking manner in the potato in spring, which will often make shoots several feet long in a dark cellar, the cells of these shoots being cellulose formed from the starch of the tuber; but before the starch can contribute to this growth it must be rendered soluble, that it may be moved to the part where growth is going on; it is well known that a potato in this condition is sweet and "soggy," and unpleasant to use as food, a condition due to the conversion of its starch into glucose (grape sugar), dextrine, and other soluble forms. The change of one form of carbohydrate into another is quite distinct from assimilation, and the name metastasis has been given to it, as the equivalent of the German *Stoffwechsel*. It is unnecessary here to consider other principles found within plants, most of which are treated in separate articles, such as fats, oils, resin, caoutchouc, special principles like quinine and morphine, acids, and many others which, though of great importance to man as vegetable products, do not, with some exceptions, take part in the growth of the plant, and often result from a conversion of some of the other principles.—*Movement of Liquids.* The motion of liquids within the plant is quite complex. Within many cells, and probably in all, when young, the protoplasm is in motion; in some cases the whole body of it is seen to rotate very slowly, though under the microscope, the motion being magnified, it appears rapid; *Vallisneria*, the tape grass or eel grass of fresh water, affords a beautiful microscopic object on account of this rotation; in other cases the motion is confined to portions of the protoplasm, and is seen in streams or strings running in various directions; this movement in one cell is quite independent of that in adjoining cells, and has no relation to the passage of liquid from one cell to another; it is regarded as a vital movement of the protoplasm. The motion of liquids from place to place within the plant, as from the root upward, is due to several causes. In the process of assimilation large quantities of water are evaporated; a great deal of water is needed as the vehicle by which nutriment is brought from the soil, and to hold the assimilated material in solution, and exhalation of watery vapor goes on rapidly in growing plants. This vapor is mainly exhaled through the stomata or leaf openings, and its amount is governed by the hygrometric condition of the atmosphere; in a damp day but little transpires; in a long continued drought evaporation might continue greatly to the detriment of the plant were not the stomata so constructed (see Leaf) as to shut off nearly all communication with the interior of the leaf. The common agricultural plants during five months of growth exhale 200 times their dry weight of water. The tissues of the plant being gorged with liquid, when evaporation takes place in the leaves there is a demand upon the parts below to supply this loss, and thus an upward flow is established from the roots toward the leaves, and the amount of water taken up by the root is in direct ratio to that given off by the leaves. If the demand made by the leaves is greater than the root can supply, the plant droops. It was formerly thought that the leaves absorbed water from the atmosphere, but experiment has shown this to be erroneous. Though the cells and ducts differ greatly in length, the tissues of the plant are really made up of closed cavities, the walls of which, though no openings have been detected, are permeable by liquids, and the movement of sap within the plant consists of a transference from one cell to another. Several physical forces are probably concerned in the movement, specially that known as osmose. When two liquids of different densities are separated by a permeable membrane there is a tendency to interchange, a small quantity of the denser liquid passing into the lighter, and a much larger quantity of the lighter liquid passing through the membrane into the heavier; this force, called osmose, explained at length in works upon physics, and easily demonstrated (see Endosmose), is sufficient to account for much of the sap movement and transference of the fluids from cell to cell; if the contents of the leaf cells are made denser by evaporation, the less dense liquids of the cells near by will flow toward them, and the movement be communicated from cell to cell down to the roots. Some of the phenomena of the movement of liquids are attributed to capillary or surface attraction, and the power of membrane to separate solutions of different kinds, discovered by Graham (see Dialysis), is evidently concerned in the nutrition of the plant. While there are no regular ascending and descending currents of sap, as was formerly supposed, the liquids in the different tissues of highly organized stems are not all alike; the ascent of water or crude sap from the root is mainly through the newer wood, and the movement of formative material or elaborated sap to contribute to the growth of parts below the leaves is through the young bast or inner bark. But growth is taking place in other parts of the plant, new stems and leaves are forming beyond the assimilating leaves, and in most cereal grains the growth of the fruit is quite above all the foliage and consequently not to be reached by descending sap. The motion of the assimilated material is toward all points in which growth is taking place, or to those in which it is to be stored as a reserve; and whenever it is appropriated, either by forming new cells or stored up as starch, these points become centres of attraction, and the movement of the material is in their direction.—*Automatic Movements and Irritability.* The movements of plants may often be readily observed; many leaves take on a different position at nightfall, as may be seen in the common locust and wood sorrel (see Oxalis), and many flowers which close at night or in dull days; in the evening primrose (see Œnothera) the petals open with a sudden jerk. The "movements of climbing plants" are admirably described by Darwin in a memoir with that title; the free end of a twining stem makes a rotary movement with a rapidity differing with the species, the hop on a warm day describing a circle in one to two hours; when the stem comes in contact with a support, it winds around it; the phenomenon can only be observed when such stems extend above the support and are free to move, in which case the upper internodes are seen to revolve as if in search of something to twine upon. Tendrils move in a similar manner; when the hooked end of a tendril catches a twig or some other object, the tendril twists into a coil, as if by shortening itself to draw the plant nearer to the support, one half of the coiling being in an opposite direction to the other half; if the tendril fails to catch hold of some object, it coils after a while, but in this case the spiral runs all in one direction. Tendrils are irritable, and coiling may be induced by slight friction. These voluntary or rather automatic movements are very slow when compared with those of some of the lower algæ, which like *oscillaria* are constantly writhing. In the higher plants this motion is seen in the flowers of some orchids, in which the lower petal or lip is raised and lowered with a regular movement; *desmodium gyrans*, sometimes seen in greenhouses, has trifoliate leaves, of which the two lateral are constantly in motion, moving by a series of visible jerks day and night. These movements are independent of any external agency, while others are due to irritability, as may be conspicuously seen in the sensitive plant (see Mimosa) and some others; the irritability of tendrils is above referred to; another striking instance of this property, apparently connected with something corresponding to a nervous system, is presented by the Venus's fly-trap. (See Dionæa.) Nor is this irritability confined to leaves; an Australian orchid shuts up its lip when an insect alights upon it and encloses the captive, and the stamens of the common barberry move if touched. —*Propagation of Plants by Division.* In many plants there is ample provision for multiplication of the individual by means of subdivision. The strawberry strikes root at each joint of its prostrate stem, a bud is formed there, and at length the stem dies, severing the connection with the old plant, and leaving these rooted portions to shift for themselves as new plants; the same thing happens with other above-ground stems, some of which only take root at the tip, which bends over and reaches the ground apparently for this very purpose. Propagation by means of underground stems or rootstocks is still more common; the rootstocks of the tall blackberry, the passion flower, and others, run along below the surface for several feet, and throw up a shoot at the end, which in time becomes an independent plant. As may be seen in some lilies, in *dioscorœa*, and other plants, buds which have been formed in the axils of the leaves fall to the ground and there take root to form new plants. These methods of multiplication are extensively imitated by the cultivator, and the operations of layering and dividing plants are in imitation of nature's methods; and we carry it still further in propagating by cuttings, which is founded upon the fact that the stem, and in many plants even the leaf, will under favorable circumstances form adventitious roots; the majority of plants if treated at the proper time may be multiplied in this way, in many each node being capable of forming a new plant. In grafting and budding the cutting, instead of being planted in the soil, is set in the tissues of another but related plant. All such propagation, whether it takes place naturally or is done by the aid of man, merely subdivides the individual, and each new plant thus obtained possesses all the peculiarities of the parent. Thus all the potatoes of any given variety, the Early Rose for instance, of which there are untold millions raised each year, are subdivisions of the original plant; and so the hundreds of thousands of Bartlett pears, all over the world, are in reality parts of the original seedling. That these subdivisions practically retain the peculiarities of the parent plant without variation, except the slight modifications caused by a more or less congenial soil, and manifested in size and vigor, is a fact of the highest horticultural importance.—*Inflorescence.* Whatever may be the provision for this kind of multiplication in nature, sooner or later the plant multiplies in another manner, by seed. In mentioning the multiplication of the lower orders a plant was cited in which the contents of any two of its cells unite to form a reproductive body or spore. In plants of a higher organization the reproductive body, the seed, is formed by a distinct set of organs, the organs of fructification, and these are collectively the flower. In annual plants the production of flowers often commences when the plant is very young, only a few weeks from the seed, while on the other hand perennial plants, especially trees, may go on repeating their organs of vegetation, or growing, for many years; some, like the century plant, which in its native country blooms in 10 or 15 years, spend all their lives in preparing for the event, and when they have bloomed die, as if exhausted with the effort; while others continue to bloom, if not yearly, at intervals for centuries. Flowers appear either at the end of the stem or in the axils of the leaves, just where leaf buds appear, and like them are either terminal or axillary. Axillary flowers appear at the base of ordinary leaves, usually upon a little stalk or pedicel, but more frequently the leaf is reduced in size; these smaller leaves are termed bracts; if at the same time the internodes of the stem are shortened, one of the commonest forms of flower cluster, the raceme, is produced; if the flowers are without pedicels, or sessile, and crowded, a spike is the result; and the pedicels of a raceme may be branched and each branch bear a flower, producing a panicle. These forms of inflorescence are readily seen to be analogous to ordinary branching; others, like the corymb, umbel, &c., appear to be more complex, but are only modifications of the forms already noted. In a corymb the internodes are short, and the lower pedicels so elongated as to bring their flowers on a plane with the upper ones; in the umbel the internodes are obliterated, the pedicels (rays) all starting apparently at the same point, and of equal length, while the bracts are brought together in a whorl to form an involucre. In the raceme the lower flowers are the oldest; and in many cases the stem or common axis keeps on elongating, so that above new buds are developing while the flowers below have fallen, and is said to be indeterminate, though generally the growth of the stem or axis sooner or later ceases. In the umbel the outer flowers represent the lower ones of the raceme, and are consequently the oldest; the flowering, beginning at the circumference and proceeding toward the centre, is centripetal, a term applied also to the raceme and similar forms. Where the flower is at the end of the stem, that ceases to elongate, and such inflorescence is determinate; flowers of this kind are often solitary, and when they form a cluster it is by the production of other flowers upon the stem below the terminal one. In such inflorescence a flat cluster, the cyme, corresponding to a corymb, may be formed, but the oldest flowers will be in the centre; such inflorescence is centrifugal. The term ament or catkin is applied to an elongated cluster of scale-like flowers; a spadix is a fleshy spike upon which the flowers, often imperfect, are closely crowded, as in the Indian turnip, the palms, and others; this is often protected by a leafy covering, the spathe, which in the Indian turnip, and especially the calla, becomes showy and commonly passes for the flower. There are other forms of inflorescence which have distinctive names, but they are all traceable to the simple forms here noted.—*Structure of the Flower.* The flower has

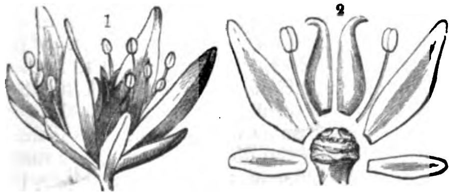


FIG. 13.—1. A complete Flower of Sedum. 2. Dissection showing receptacle and two members of each series, sepals, petals, stamens, and pistils.

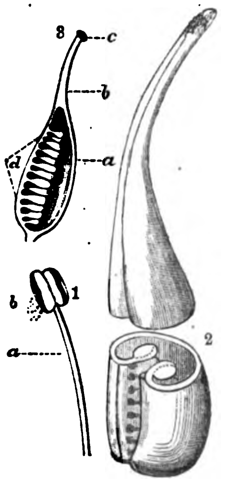
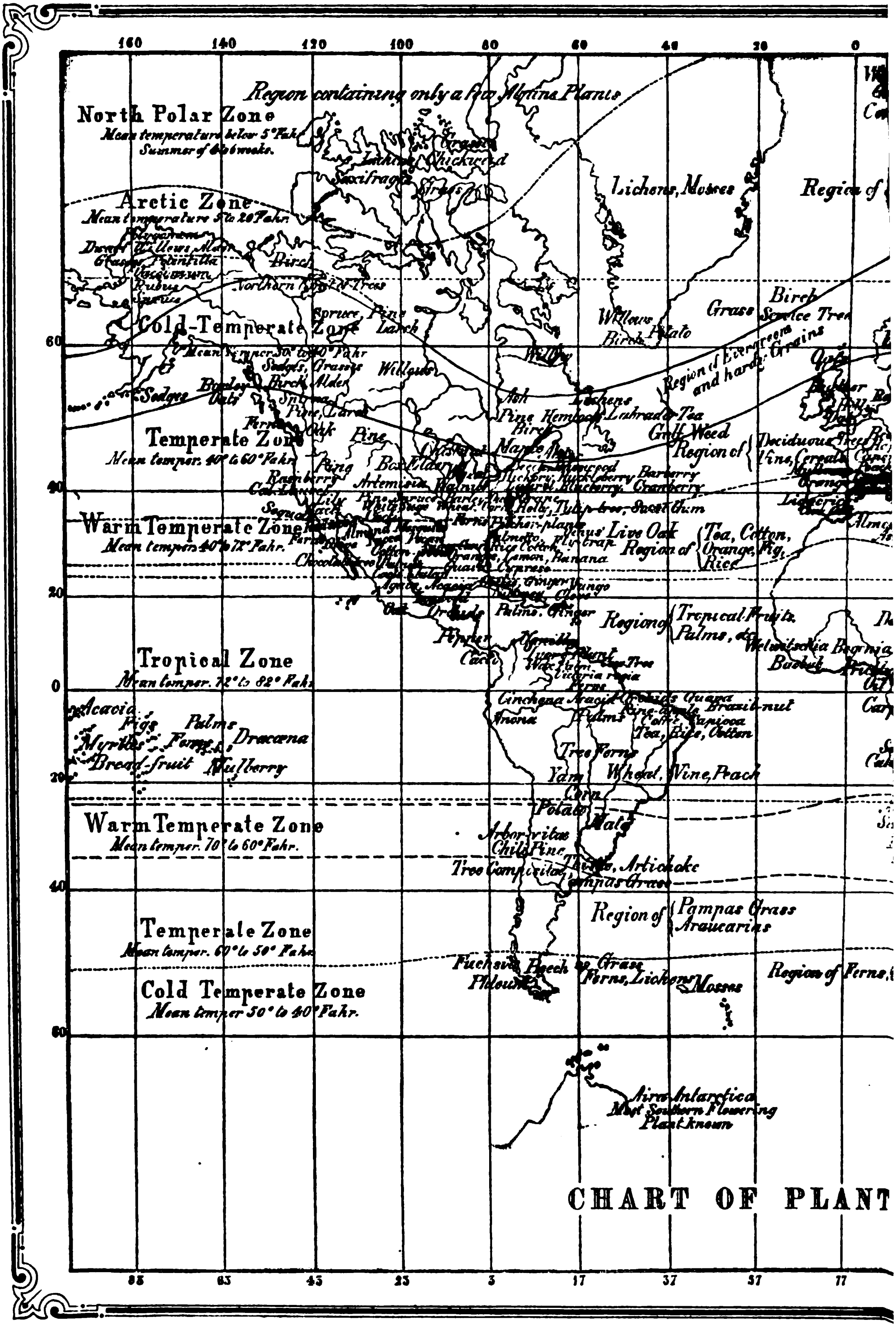


FIG. 14.—1. Stamen: *a*, filament; *b*, anther discharging pollen. 2. Pistil and cross section. 8. Pistil cut lengthwise: *a*, ovary; *b*, style; *c*, stigma; *d*, ovules.

for its end the production of seeds, and all its parts are subservient to that. Numerous as are the forms presented by flowers on every hand, they may all be referred to one simple plan. Instead of taking the simplest form of the flower for illustration, the plan of its structure may be best understood by the examination of one of the more complete forms, one which has all the parts to be found in any flower. There are many flowers which might serve as a pattern or type, but there are reasons for using the one selected by Gray in his admirable "Lessons," one of the sedums or stonecrops. An examination of this flower shows, beginning from without, a series of five green, leafy parts, which together form the calyx; the parts are sepals. Within these are five more delicate (and in this case white) leafy bodies, called petals, which form the corolla; and these two together are the floral envelopes. Immediately next to the corolla, toward the centre of the flower, is a series of (in this case 10) bodies, the stamens, quite unlike calyx and corolla, being slender threads with a knob at the apex of each; and quite within all the other three series is a cluster of five green parts, the pistils. As the two outer series are termed the floral envelopes, the inner two, the stamens and pistils, are the essential organs. All of these, in the order here named, are placed upon the end of the flower stalk, which often has an enlargement to hold them, called the receptacle. A longitudinal section through the flower would show each series placed one above the other upon the receptacle; or their position may be made plainer by an illustration giving two of each series detached, but in their relative positions. The calyx is generally green and leaf-like in texture, though in some plants, as the fuchsia, it is colored, a term used in botany for any other color than green. The corolla is of a more delicate texture and is very rarely green, but is usually the most showy part of the flower. The stamens have two distinct parts, the stalk or filament, and the anther or knob at the top; the anther is the important part of the stamen, as the filament may be short or wanting; it usually consists of two cells which open longitudinally to discharge the pollen, though in other plants there are various other ways for its escape. The pollen, or male element, consists of minute grains, usually rounded, and is generally yellow. The pistil consists of three parts: the lower distended portion (often more distinct than in this plant), the ovary; an elongated portion, the style; and at the apex a part without epidermis, and usually viscid, the stigma. The ovary, being cut open longitudinally, is found to contain (in this case) numerous small pulpy bodies, the ovules. The influence of the pollen falling upon the stigma causes a growth to take place within these ovules, which results in the formation of seed. Such being the parts of the flower, and such their general functions (to be more fully mentioned further on), it remains to point out the leading modifications these parts undergo to produce the great diversity flowers everywhere present. The pedicel or flower stalk and the floral leaves or bracts, not strictly belonging to the flower, are placed so near it that they may affect its general appearance, or that of the flower cluster taken as a whole; in the Venetian sumach or smoke tree, the flowers are very small, but the pedicels, especially those which bear no flowers, are thickly clothed with hairs and increase in size, so that the conspicuous part of the inflorescence is these plumed stalks. The bract, besides differing in size and form from ordinary leaves, in many plants becomes petal-like and conspicuous; in the linden or basswood, each peduncle, or common flower stalk, has at its base a long ribbon-like bract attached for about half its length to the peduncle, and of a pale straw color which makes it nearly as conspicuous as the flowers. (See LINDEN.) In some sages, especially *salvia splendens*, the bracts are larger than and quite as brilliant as the flowers themselves, and much of the showy character of the plant depends upon them; while in *euphorbia pulcherrima* (best known as *Poinsettia*) the plant is cultivated solely for its gorgeous scarlet bracts, which surround a cluster of inconspicuous flowers The appearance of a whorl of bracts as an involucre was noted in describing the umbel. Flowers of the large family of *compositæ* have involucres often of many series of closely overlapping bracts (*e. g.*, thistles and sunflowers), in some cases leafy, and in others so unlike leaves as to be reduced to mere papery scales. The ter mination of the flower stalk, already described as the receptacle, and also called *torus*, is ordinarily slightly enlarged to make room for the parts of the flower which are attached to it; in some cases it is prolonged within the flower, as in the geranium and magnolia; in the passion flower it elongates and lifts the pistil far above the floral envelopes, and this occurs in other flowers; in the strawberry it is short and conical to accommodate the numerous pistils, and after flowering becomes large and juicy, and is the edible portion, while the proper fruits are the little seed-like bodies upon its surface. The receptacle in the rose, instead of bearing the pistils on its outer surface, is hollowed out, and they are attached to the interior of this cavity, the rose fruit or hip, being in structure like an inverted strawberry. In the great water lily (*nelumbium*), the pistils are immersed in pits in the surface of a broad receptacle, which in fruit is several inches across. In these examples the receptacle has been that of the single flower; the same name is also given to the end of the stem when enlarged to receive several flowers, as in the *compositæ*. Sometimes, as in *Dorstenia*, the receptacle bears the flowers sunken in cavities in its substance, or, as in the fig, the common receptacle is hollowed and has its inner surface studded with minute flowers; but these forms of the receptacle belong to the inflorescence rather than to the flower. The disk or torus, so conspicuous in the mignonette, sumach, and other flowers, sometimes adherent to the ovary and calyx, is a development of the receptacle.—*Floral Envelopes.* In the flower taken as an example the parts of the calyx and those of the corolla are all alike, and the flower is regular; both series of floral envelopes being present, it is complete; and the parts in each series being five in number, or in the stamens twice five, the flower is symmetrical; in descriptive botany the opposite of these conditions is expressed by the usual prefix, as irregular, incomplete, &c. The floral envelopes collectively, whether of two series or only one, are termed the perianth. If one of the sepals or one of the petals is unlike the rest in size or form, the flower becomes irregular; the violet has three of its petals larger than the other two, and the irregularity is increased by the prolongation of one petal into a spur. In the larkspur the calyx is petal-like and much larger than the corolla; one sepal bears a long spur, which gives the plant its name, while the petals, much smaller and of irregular shapes, are only four. In this case the symmetry of the flower is broken up, one petal being lacking, and this absence or suppression of petals may include more than one, even the whole series, when the flower is apetalous. If but one series of floral envelopes is present, it is always regarded as the calyx, even if, as is often the case, it is petal-like. Many families of plants are constantly apetalous, and it is not unusual to find apetalous genera in families where the majority of the plants have petals. Other variations are produced by the cohesion of the members of the same series; the sepals unite by their edges to form a monosepalous or gamosepalous calyx, and the petals to form a monopetalous or gamopetalous corolla; this cohesion varies greatly in degree, from being confined to the base of the parts up to their union into a complete tube, with every intermediate gradation. Where the union is more complete with some of the sepals or petals than the others, as in a five-parted flower, where two are united in one body and three in another, a two-lipped calyx or corolla is the result. The united portion of a calyx or corolla of this kind is its tube, and the free portion its limb. The terms used in describing the forms of these are usually derived from common objects, such as bell-shaped, funnel-shaped, wheel-shaped, and others; while special names are given to other forms, as labiate to the ordinary two-lipped corolla, which is itself capable of a great number of forms, in some of which one of the lips is nearly obsolete; a two-lipped corolla with its throat closed by a projection, the palate, is called personate. In the *compositæ* ligulate or strap-shaped flowers are common, such as the rays of the sunflower; in this the union of the petals is complete except at one side, which allows the whole to lie flat, though the union is generally manifest at the base. A handful of wild flowers or of single ones from the garden will afford numerous illustrations of these modifications of the floral envelopes, and many others. The office of the floral envelopes, the calyx and corolla, being to protect the essential organs, the stamens and pistils, we in most cases find one or both present; there are naked or achlamydeous flowers in which both are wanting, but here their place is generally supplied by a bract, which serves to protect the essential organs; the graceful and fragrant lizard's-tail of our streams (*saururus*) affords an interesting example of naked flowers.—*Floral Organs.* The stamens (collectively the *andræcium*) are next within the corolla, and present a great variety in form and number; their filament or stalk may be very long, or so short as to be imperceptible; the anther usually consists of two cells, and these are frequently placed one at each side of the filament at its apex; the portion of filament between the cells is the connective, and this may be prolonged more or less beyond the anther, and assume various shapes; in the oleander it appears as a long hairy tail; in some instances it is widened in such a manner as to separate the two cells far apart; the filament is often broad and flat, and sometimes bears appendages at its base. In the common pansy and other violets it is on two of the stamens prolonged into a process at the back of the anther much longer than the filament itself. In methods of attachment to the filament the anther presents some variety; it may be at the very apex (innate), or with one cell at each side of the filament (adnate), or it may open toward the pistil (introrse), or away from it (extrorse), and again it may, as in the lily, be hung by the centre and move in any direction (versatile). The various shapes assumed by the two lobes are used in descriptive botany, as are the methods by which the pollen is liberated; instead of the usual longitudinal slit, each cell may have a pore at the top, or each may have, as in the barberry, one, or as in the sassafras and others of the laurel family, two valves, or trap doors, hinged at the top, which open to liberate the pollen. In respect to numbers, they range all the way from a solitary stamen to so many that the number is regarded as indefinite; when of the same number as the petals, they are usually alternate with them; when twice as many, then one is opposite the petal and the other alternate. The stamens sometimes appear in two or more definite series; often a certain number have no anthers and are abortive. As with the sepals and petals, the stamens are often united; when their filaments cohere to form a tube (*e. g.*, the mallow family), they are monadelphous; if in two groups (*e. g.*, pea), they are diadelphous; and they may unite in threes or larger clusters. Where the union takes place by the anthers, leaving the filaments free, the stamens are syngenesious.—When the anther has reached its full development it opens in one way or another for the exit of the pollen, which is usually a loose powder, most frequently yellow, but sometimes brown, purplish, bluish, &c.; usually globular or oval, it is sometimes polyhedral, in the pine of three, and in the cat-tail of four united grains. In many orchids it is bound together in pollinia by elastic threads (see ORCHIDS), and in the milkweeds (*Asclepias*) it appears as solid waxy masses. In size the pollen grains vary from $\frac{1}{10}$ millimetre to $\frac{1}{100}$ or even less. Some kinds of pollen have a surface beautifully marked with spines, or by the unequal thickening of the membrane. In structure the grain consists of an outer (extine) and an inner (intine) membrane, and is within filled with a thick granular liquid, the *fovilla*, which is its essential part. When pollen is moistened under the microscope, the grains swell and burst, either by slits or by pores, which are thinner parts of the outer membrane, and through these the inner membrane protrudes in what is called the pollen tube, which in turn soon bursts and sets free the fovilla. The number of openings in the outer membrane of the pollen grain varies from one to several, though but one is used.—The pistil (or *gynæcium*) occupies the centre of the flower, and to the nourishment, protection, and development of this all other parts are subservient. Its parts, ovary, style, and stigma, have been already pointed out. In the flower chosen for illustration there are five separate and distinct simple pistils, and these are arranged in a circle in the centre of the flower; often there is but one, which then occupies the centre, or if there are two, they stand face to face in the centre; its occasional elevation upon a prolonged receptacle has been referred to. In the pistil already illustrated the parts are not so distinct as in some others. The ovary and stigma are the essential portions, and the style is frequently not manifest, the stigma being sessile directly upon the ovary (*e. g.*, poppy), but in many cases it is much elongated, and as in colchicum several inches long. The pistil already referred to is what is called a simple pistil or carpel, having but one ovary, one style, and one stigma. As with other parts of the flower, the pistils sometimes cohere to form a compound pistil; this union may involve the ovaries only, or even only the lower parts of them, leaving the styles distinct; it may include the styles, the stigmas remaining separate; or all may be united throughout. The stigma, if terminal, may be a simple knob; it is sometimes lobed, and in some cases, as in *Sarracenia*, forms an umbrella-like body, with stigmatic points at the margin. (See PITCHER PLANTS.) In some flowers it is not conspicuous, but simply a space denuded of epidermis; and it generally has a viscid secretion to hold the pollen which may fall upon it. The ovary of a compound pistil, when transversely divided, usually shows as many cells as there are simple pistils entering into its composition; if the five simple pistils of our typical flower were to be consolidated into one, it would bring the placentæ or ovule-bearing portions in the centre, and this position (axile) of the placentæ is very common in compound pistils; but in some flowers (*e. g.*, poppy) a compound pistil may be one-celled, with its placentæ in lines upon the wall of the ovary, a peculiarity of structure to be hereafter explained. In the compound pistil formed by the union of simple ones, or carpels, the division walls of the cells, extending from the circumference to the centre, are structurally double, as may often be seen in the fruit.—*The Ovule and Fertilization.* A section of the simple pistil or carpel of the typical flower shows the ovules at one side; they are attached to two lines of loose tissue, the placentæ, and in this case are numerous; often the ovule is solitary; sometimes there is a definite number, and again so many as to be indefinite. It has been already intimated that the ovule is the undeveloped seed, but more strictly speaking it is the organ within which the seed is to be formed; it at first appears as a minute papilla or pulpy swelling upon the placenta, the nucleus; soon a coating grows outside of and envelops this, which is soon followed by a second and similar coat, thus enclosing the nucleus within two sacs, having at the top corresponding openings, the foramen or micropyle; the ovule is supported upon a longer or shorter stalk, the *funiculus*. The ovule may be straight, bent over on itself, or bent down upon its long stalk so that it is completely inverted. When it is fully developed a cavity is formed in or near its centre, the embryonic sac, which is filled with mucilaginous material. If the ovule is not fertilized, *i. e.*, does not receive the influence of the pollen, it with the ovary develops no further. If pollen falls upon the stigma the pollen tubes are protruded and make their way down through the loose tissue of the style, probably receiving nutriment from that to promote their growth, until the embryo is reached, where the act of fertilization takes place. Physiologists are not agreed as to precisely in what the act of fertilization consists; the pollen tube has been traced from the stigma down through the tissues of the style to the foramen of the ovule; after this takes place there appears within the nucleus of the ovule an embryonic vesicle, constituting the commencement of a new plant, which begins with a single cell, formed through the influence of the pollen, and this by its increase through subdivision develops into an embryo or young plant, the coats of the ovule at the same time enlarging and changing to become the coats of the seed. But the changes in the embryo are not the only ones which follow fertilization; the ovary itself greatly enlarges and alters, and becomes the fruit, a name in botany applied to the ripened pistil and the parts attached to it, without reference to edible or other qualities. With the completion of the embryo the seed and fruit are mature.—*Morphology of the Flower.* Before describing the fruit, reference must be made to other modifications in the flower as well as to the nature of the flower itself. The adhesion of parts of the same series has been described, but there is another union of parts which not only greatly modifies the flower and obscures its structure, but which often has a marked influence upon the character of the fruit. This is the cohesion of parts of different series: the sepals and petals may not only unite among themselves, but the calyx may unite with the corolla for a portion of their length; this union sometimes includes the stamens (*e. g.*, peach and cherry), in which case the petals and stamens appear to be inserted upon the margin of the calyx tube, though structurally all are regarded as having their origin on the receptacle, and cohering for a part of their length. This union may proceed still further, and in part or in whole involve the ovary (*e. g.*, apple and pear), when the other parts of the flower appear as if inserted upon the top of the ovary, giving rise to the term inferior ovary of the older botanists. It sometimes occurs that the calyx and corolla remain distinct, while the stamens and pistils are blended in one mass (see ORCHIDS); such flowers are said to be gynandrous. In describing the organs of vegetation some of the many forms assumed by root, stem, and leaf have been pointed out, and it has been shown that these are often turned aside from their ordinary uses and made to serve some entirely different one. Now when the plant is ready to provide for its reproduction by seed, is an entirely new set of organs called into existence, or are those with which the plant is already provided made to serve for this purpose also? What has been shown of the morphology of the organs of vegetation has prepared the way for the statement that a flower is only a peculiarly developed branch, and that its parts are only modified leaves. The theory of metamorphosis, as it is termed, does not assume that the parts of the flower were formed first as leaves and then transformed into sepals, petals, &c., but that they are homologous with leaves; and that plasticity which allows a leaf to appear at one time as a tendril, at another as a spine, again as a pitcher, or as a most efficient trap for catching insects, will allow it, when the plant requires such organs as stamens and pistils to produce seed, and calyx and corolla to aid in the work, to assume these forms, which in many cases are not further removed from the normal condition than occurs when there is no doubt that the organ is still a leaf. But a few of the many illustrations in support of this theory can be cited. It has been shown that flower buds, and consequently flowers, appear in the same place as do leaf buds—terminating the principal stem, or sessile, or on small branches in the axils of its leaves; also that when a flower cluster is formed it results from a modification of the usual manner of branching. The flower terminates the stem upon which it is placed, whether the main stem or flower stalk, the usually enlarged and rounded end of the stem becoming the receptacle, upon which the parts of the flower are placed, one above another; in viewing a flower as a modified branch, we find its internodes very short, but scarcely shorter than in the houseleek, where they are so abbreviated as to bring the leaves so close together that they touch; indeed, except in color, some plants of that family closely resemble the flower of a double camellia or rose. Abnormal developments often throw much light upon the real nature of the flower and its parts, in which, the vital forces of the plant being from some cause disturbed, there is a reversion of the parts to the leaf or toward it, or retrograde metamorphosis as it is termed. Cases have been already cited in which the receptacle is prolonged in the centre of the flower to make room for the numerous pistils; but it not rarely happens, in the rose, for example, that the receptacle is abnormally prolonged and assumes the true character of a branch, growing several inches in length, bearing true leaves, and being terminated by an another flower bud. The writer had a specimen in which this was repeated a third time on the same flower. The calyx is so generally green that its leafy nature is manifest, and often in the rose the divisions of the calyx become pinnate, like the ordinary leaves. The resemblance to green leaves is less manifest in the petals, as their more delicate texture and often brilliant colors aid in disguising them; but these colors and texture are often quite as striking in bracts, which are unmistakably leaves and in no wise attached to the flower. In many cases it is impossible to distinguish between calyx and corolla; where there are many series of these parts, as in *calycanthus*, it is very difficult to say which is calyx and which corolla; some of the double camellias of the greenhouse show this in a striking manner, and in the magnolia calyx and corolla are only to be distinguished by position. In the green rose the place of the petals is occupied by a cluster of green leaves. In many flowers the petal is narrowed at the base into a claw, which corresponds to the petiole of the leaf, and this is sometimes, as in the pink, very conspicuous; petals with a manifest claw correspond to petioled, and those without it to sessile leaves. The stamen shows much less resemblance to the leaf than do the sepal and petal. The filament represents the petiole or stalk of the leaf, and the theoretical structure of the anther is that it corresponds to the blade of the leaf with its edges curved in toward the midrib to form the two cells of which most anthers consist; the midrib of the leaf is the connective; the cellular tissue of the leaf undergoes marked changes and is developed as pollen. The stamens are frequently transformed into petals, which are undoubted leaf-like organs, as may be seen in any partly double rose and many other semi-double flowers; if stamens are visible in a double rose, it is generally easy to find bodies in every intermediate state, from a nearly perfect petal with the vestiges of an anther upon its edge, a body half petal and half stamen, to a nearly perfect stamen with a fragment of petal developed upon it. The double columbine of the gardens affords a still more striking illustration; in this flower the petals are in the form of a hollow curved spur, and the stamens may be found with a filament, but bearing in place of the anther one of these curved petals. The rose often shows a complete series of transformation from the calyx to the stamen: first perfect sepals, within these petals with a green midrib or partially changed to sepals, then perfect petals, and within these the intermediate states between petal and stamen. The double rose is a flower in an abnormal state, but we find similar gradations in wild flowers unchanged by cultivation; a striking example of this is shown in the white water lily (*nymphæa*), in which the calyx is green on the outside and petal-like within; within this are several series of petals, some of the inner ones with an abortive anther at the tip, and so on toward the centre, the petal gradually disappearing and the anther more perfectly developed, until true stamens are found bearing no resemblance to petals.—In some compound pistils it is difficult to trace any resemblance to the leaf, but when the pistils or carpels are distinct, especially in flowers with a solitary pistil, the foliaceous character is manifest. It is not difficult to see that the pistil of our typical flower, or that of the larkspur, pæony, or the common pea, may be formed by folding the edges of a leaf together and uniting them to form a hollow sac or pouch; that this is the real nature of the simple pistil may often be seen in the double cherry, in which the retrograde metamorphosis is strikingly exhibited, an infolded leaf actually standing in place of the pistil, its prolonged midrib, the style, bearing the knob-like stigma at the end. Other plants afford illustrations of the same point, especially an alpine strawberry, which produces all parts of the flower, even the stamens, as green foliaceous bodies, and the pistil, though minute, as a bud of overlapping leaves. Taking this view of the simple pistil, that it is an infolded carpellary leaf, several theories have been proposed as to the nature of the ovule, and the subject has given rise to much discussion. Schleiden regards the ovules as buds produced upon the edges of the carpellary leaf, and the placenta as a cellular growth from its margins; though the edge of a leaf is an unusual place for buds to appear, some plants naturally produce them there, especially *bryophyllum*, which propagates itself from buds upon the leaf. This view of the homology of the ovule is supported by the fact that a number of abnormal pistils have been observed in which leaf buds appear in the place of ovules; a case of this kind is a monstrous columbine, in which the simple pistils develop as flat leaves, and bear leaf buds upon their edges. Accepting this view of the structure of the simple pistil or carpel, that part of it which corresponds to the midrib of the leaf is the dorsal suture, and the union of the edges of the leaf forms the ventral suture, the placenta being always borne here. When two or more simple pistils are united, it is by their ventral sutures, and the collective placentæ will be in the centre; the placenta is sometimes free in the axis of the compound ovary, a state of things often caused by the obliteration of the dissepiments or division walls. In many compound ovaries the placentæ are parietal, or upon the sides of the ovary; a pistil of this kind is regarded as composed of several carpellary leaves, which, instead of infolding and uniting in the manner already described, are placed in a circle and joined by their contiguous edges; the placenta in this case, instead of being composed of two edges of one carpellary leaf, is formed by the edges of two different adjacent leaves. By the projection of the parietal placentæ toward the centre of the ovary a great variety of forms are produced, some of which are quite puzzling.—*Double Flowers.* These, to which frequent reference has been made, rarely appear in nature, though those having normally more than one series of petals may sometimes be taken for such. In horticulture a flower is regarded as double when its proper number of petals is much increased; in many cases the beauty of the flower is greatly enhanced by doubling, as in the rose; but those flowers the beauty of which is largely dependent upon the regularity and symmetry of their parts, the lily for example, are only disfigured by becoming double. Doubling is most frequently produced by the conversion of the stamens into petals; but in many cases it is due to the production of two or more petals in the place of one, and there are double flowers which neither of these causes fully accounts for. Doubleness is regarded as indicating a tendency to sterility, and whatever disturbs the reproductive functions tends to produce double flowers; fertility is diminished by a variety of causes, and long cultivation in a rich soil is one of the most common. When any derangement of the forces of the plant causes the stamens to be sterile, they revert to petals; when this once takes place, the flower "breaks," as the gardeners say, the tendency becoming hereditary; seedlings from a plant thus changed are in some cases likely to show a greater departure from the normal condition, and by continuously selecting seeds from those in which the tendency to become double is strongest, the habit may be fixed; finely doubled flowers have been produced in this manner from one in which only a single extra petal appeared. The stamens become sterile first, and a flower may have all of its stamens converted into petals, while the pistil is still fertile; such flowers fertilized by the pollen from a single or partially double one will yield seeds with a strong tendency to produce double flowers. When the metamorphosis is carried so far as to involve the pistils, the plant can only be propagated by cuttings or other subdivision. The doubling in flowers of *compositæ* is not due to a change in the stamens; in the natural state of the dahlia, sunflower, and others, there is a disk of small tubular flowers, surrounded by a ray of much larger flat and showy ones; these flowers are regarded as double when the tube-shaped corollas of the disk are developed like those of the ray. The *Poinsettia* has been mentioned as a plant cultivated for the showy bracts which surround a cluster of small inelegant flowers; a double variety of this was discovered by Roezel in Mexico; in this the flowers are changed into leafy branches, and these leaves are colored like the ordinary large bracts, exhibiting a large mass of brilliant color without any flower at all being concerned.—*The Fruit.* This has already been described as the ripened (simple or compound) pistil, and such accessory organs as remain attached to it. The changes the pistil undergoes in maturing are often very striking; one of these is a great increase in size; another frequent change is in the tissues, which may become exceedingly pulpy and soft, or on the other hand may be indurated and even become bony. Another marked change occurs in the substance; the pistil, which at first was essentially the same in composition as a leaf, as it enlarges becomes, as in the grape, charged with acid, or in the persimmon with tannin, and as the fruits reach maturity the acidity or astringency gives place to sweetness, indicating the formation of sugar. The interior structure of the pistil is sometimes not to be traced in the fruit; the number of cells may be diminished, or by the formation of false partitions increased; the number of seeds perfected is often fewer than the ovules; while the peach, almond, and their allies always have two ovules in the ovary, but one generally becomes a seed, though both sometimes develop, as "double-meated" almonds and peach stones are not rare. In the oak the ovary has three cells with two ovules in each cell; in ripening the three divisions are obliterated, and five ovules perish, as we find the acorn to be only a one-celled, one-seeded fruit. A few examples drawn from familiar plants will illustrate the changes the pistil undergoes in becoming a fruit. One of the important characters in descriptive botany is the dehiscence, or way in which the fruit opens; many fruits, both simple and compound, are indehiscent, but in other cases fruits of both kinds open to let out the seed; the dehiscence in a simple carpel may be along the ventral suture, or by both sutures; and in a compound fruit the carpels may open upon the back, or they may break away from one another and open by the ventral suture: there are several anomalous forms of dehiscence which seem to bear no relation to the structure of the pistil, as where the fruit opens by a regular lid. The ripened ovary, or the wall of the fruit whatever changes it may undergo, is the pericarp. In the common buttercup the fruit is small, dry, one-seeded, and indehiscent; such fruits are akenes; the proper fruit of the strawberry is of this kind, the edible portion being the enlarged receptacle. The fruit of the columbine, pæony, and larkspur results from simple pistils; these open at the ventral suture and expose the numerous seeds; such a fruit is a follicle, from which to the legume or pod is but a step; in the pea it is dehiscent by both sutures, and the carpel falls apart in two valves; in the pea the pericarp still retains something of its leafy character, and in the common bladder-nut the walls become very thin and papery, and before they are fully matured are strikingly leaf-like. The most remarkable change in a simple pistil is seen in the drupe, of which the almond, peach, plum, cherry, and others known as stone fruits, are examples; in these the carpellary leaf undergoes two very unlike changes; the interior portion of the ovary, that corresponding to the upper part of the leaf, as the fruit matures has its cells filled up by a deposit which makes them nearly solid, and the tissue which they form, the stone of the fruit, exceedingly hard and bony; while this is going on the outer portion, or the under side of the leaf, increases greatly in thickness and becomes fleshy, juicy, and edible, as in the peach and others, while in the almond, though it becomes thick, it is hard and dry. The stone (*putamen*) in these fruits is not a part of the seed, but of the pericarp. Of the same structure with these conspicuous examples of the drupe is the very small drupe of the raspberry and blackberry; in these each ovary becomes a minute stone fruit; these as they grow are much crowded, and in the raspberry they cohere, but when mature they separate entirely from the receptacle, which has nourished them, as a little cap; in the blackberry the little drupes retain their hold upon the receptacle, which becomes more or less juicy and edible. Berry is a general name for fleshy fruits, without reference to the number of carpels; in the papaw the fruit is an elongated very pulpy berry, resulting from a simple pistil; in the grape the pistil has two carpels, and in the gooseberry and tomato three; in the tomato cultivation has brought the fruit into an abnormal condition, and while its botanical structure is broken up and confused, it is much improved in an economical point of view, as the fleshiness in this belongs mainly to the placenta. A pepo is a berry with a hard rind, of which the squash, melon, and all of the gourd family are illustrations; in the proper gourd the rind when ripe is very hard and woody, and the pulp dry; in the watermelon and cucumber the rind never becomes very hard, while the pulp is very juicy. In the orange, lemon, and others of the family, the fruit results from a many-celled ovary; when ripe it has a leathery and often very thick pericarp; the cell walls remain and divide the fruit into sections, which are filled with separable cells containing a watery juice; this kind of fruit is called a hesperidium. Of dehiscent fruits, or capsules resulting from a compound pistil, the crucifers or mustard family present a simple form; the mustard, cabbage, and others have the form called silique, in which the ovary consists of two carpels and has two parietal placentæ; the capsule usually falls apart in two valves, leaving the framework to which the seeds are attached. In the iris, the three carpels break open on the back (loculicidal dehiscence), while in the colchicum the cells open at the ventral suture (septicidal). The poppy capsule liberates its seeds through a number of openings below the persistent stigma; in the common purslane of the gardens the capsule opens by a transverse fissure, the upper half falling away. In indehiscent fruits the pericarp sometimes decays to set free the seeds, and in other cases it is ruptured by the swelling of the contained seed when it germinates. Among fruits formed by the aid of other parts than the ovary, the most common is the pome, of which the apple is a familiar illustration; as in the flower of the apple the calyx is so united with the ovary that it appears as if seated upon it, so in the fruit we find this union of calyx and ovary still continued; in the apple the proper carpels are the parchment-like bodies which are found at the core, and when the fruit is cut across appear arranged in a circle in the centre, and enclosing the seeds; these are immediately surrounded by a pulpy expansion of the receptacle, and outside of the whole is the enlarged succulent calyx tube which makes up the greater bulk of the fruit, its persistent free divisions generally remaining in a withered state when the apple is mature. In the aromatic wintergreen or checkerberry, the edible portion of the fruit is the enlarged calyx, not in this case united with the ovary, which is a dry capsule loosely invested by the pulpy calyx. The grain (*caryopsis*), of which the cereals are examples, results from a one-seeded ovary, the seed usually adherent to the proper pericarp, which becomes very thin and papery, and is commonly known as the hull. Fruits which result from several distinct flowers closely crowded upon a common axis are aggregate fruits, of which the pineapple is a remarkable illustration. (See Pineapple.) The mulberry shows a similar structure on a much smaller scale. In the pine family the pistil is an open carpellary leaf or scale, and the same structure is retained in the fruit, where the scales enlarge and become woody, as in the pine and related genera (see Pine), or they become fleshy, as in the juniper and some others. The cashew (*anacardium*), a tropical tree, presents a most anomalous fruit, it being no part of the flower; the pistil ripens into a nut, sometimes found in commerce, the cashew nut, and at the same time the peduncle or flower stalk undergoes a change, swelling into a pear-shaped, pulpy, edible mass called the cashew apple, upon the top of which the nut rests.—*The Seed.* The proper nourishment, maturing, protection, and final distribution of seeds are the ultimate object of all the varied forms of the fruit. The internal structure of dicotyledonous seeds has been sufficiently described. Monocotyledonous seeds present an equal variety in their structure and methods of germination. In some cases the embryo is an elongated cylindrical body, in which no distinction of parts is apparent until germination takes place; the lower end of an embryo of this kind (*e. g.*, onion) is the radicle, and the upper portion is a cotyledon, wrapped around a plumule, which shows itself when the seed germinates; on the other hand, maize or Indian corn has a highly developed embryo, in which the radicle is distinct, bearing a single large cotyledon partly enveloping that and the plumule, which consists of several rudimentary leaves closely enwrapping one another. In monocotyledonous plants the growth of the primary root soon ceases (see Palm), abundant secondary roots being formed from the lower nodes of the proper stem or axis, as may be seen in young plants of maize.—The ovule has been described as having two coats; these when the embryo is ripe become the seed coats; the inner, the *tegmen*, is sometimes manifest, but it is often united with the outer or wanting altogether. The outer seed coat, the *testa*, varies greatly, and it is due to the character and markings of this that seeds differ so greatly in their external appearance. It may be soft and membranous or hard and bony; its surface is often marked by furrows, pits, and other irregularities; it sometimes expands into a broad wing (*e. g.*, catalpa), or produces a tuft of silky hairs (*e. g.*, milkweed). The appendages to the seed coat of one plant are of vast importance to the world; the fibre, cotton, is only elongated simple cells produced from the spongy testa of the seed coat of *gossypium.* These and other appendages aid in the dispersion of the seeds; the one-seeded akenes of the composite family, often mistaken for seeds, also present a wonderful variety of contrivances for dissemination. The stalk of the ovary (*funiculus*) retains the same name in the seed. In falling away from the stalk when ripe the seed shows a scar upon its testa, the *hilum*, sometimes a mere point and obscure, often quite noticeable, as in the bean, and in the horse chestnut very broad and conspicuous. Some appendages of the seed are due to an expansion of the funiculus, while others are regarded as a growth from the micropyle, but the distinction between the two is not always manifest. The seed of the white water lily (*nymphæa*) is surrounded by a delicate transparent sac (*arillus*) of this nature; the pulpy covering of the seeds of the burning-bush (*euonymus*) and waxwork (*celastrus*) is an aril, and in the nutmeg the same organ becomes an important product, mace. The content of the seed, whether it consists of the embryo only, or both that and the albumen, is the nucleus, the structure of which has been sufficiently described in speaking of germination.—In this sketch of the plant but little reference has been made to the great series of cryptogamous or flowerless plants, which are subdivided into several classes, each having its peculiar structure and method of reproduction; accounts of these may be found in the articles ALGÆ, FERNS, FUNGI, LIVERWORTS, LYCOPODIUM, and MOSSES. —*Classification of Plants.* While plants everywhere are engaged in essentially the same work, that of vegetation or the growth of the individual, and reproduction or providing for the continuation of the kind by seeds, the details of these operations, as has been shown, are wonderfully varied; to study such a multitude of plants understandingly, they must be grouped and arranged into a system. Some account of the different methods that have been from time to time employed is given in the article BOTANY. The natural system, attributed to Jussieu, who more distinctly presented it than any of his predecessors, has been greatly modified and improved by the labors of subsequent botanists; the most recent presentation of this is in the "Synopsis" appended by Dr. J. D. Hooker to the English edition of Le Maout and Decaisne's "General System of Botany," translated by Mrs. Hooker; in this the arrangement to be adopted in Hooker and Bentham's *Genera Plantarum* is indicated. It has already been shown that flowering plants are divided into two great classes founded upon the structure of the seed, monocotyledons and dicotyledons, which are accompanied by differences in the structure of the stem, called endogenous and exogenous growth. These are subdivided into subclasses, divisions, and other groups founded upon the structure of the flower. Classification by whatever system commences with grouping individuals into species; it has been suggested that it is difficult to define the limits of the individual in plants, as they are made up of a multitude of parts, each of which with proper care may be separated and continue an independent existence. If the question of individuality has given rise to much discussion, not less so has that of the species. It is not easy to give a brief and satisfactory answer to the question, What constitutes a species? One of the best definitions is, that it is a collection of individuals so nearly alike that they may have been the progeny of one parent. Some botanists believe that a species may vary widely, and others rank what the former would consider mere varieties as distinct species; while Bentham considers that the various forms of the European blackberry and dewberry are reducible to two species, some other botanists enumerate 36; the rich collection of facts brought together by Mr. Darwin in his "Origin of Species" and "Variation of Plants and Animals under Domestication" shows the wide variations of which species are capable, and has led naturalists to take very liberal views of their limits. This liability to vary, and the fact that peculiarities in species may be rendered permanent, are of the greatest importance economically; while many desirable departures from the normal form can only be continued by subdivision, others, as in annual and biennial plants, may be propagated by the seed; by careful selection of plants as seed-bearers, and continuous sowing of seed for several years in succession, a peculiarity becomes fixed and a race is produced. Species are grouped into genera founded upon similarities of structure, and where the genus is a large one it is divided into subgenera, and these again into sections. We find genera large or small, according to the importance attached to points of structure by different botanists; while most regard the pine, spruce, larch, and others as sufficiently unlike to rank botanically, as they do popularly, as distinct genera, some class them all in the pine genus. Kindred genera are grouped as families or orders; these when large are often subdivided, and we have suborders, tribes, and subtribes. The peach, strawberry, blackberry, rose, and apple have certain characters in common, which bring them all into the rose family; but they differ so much in other respects that they fall into three subfamilies, the peach in one, the apple in another, and the others in a third; still further, the strawberry, blackberry, and rose, though in one subfamily, are sufficiently unlike to be placed in separate tribes. The next



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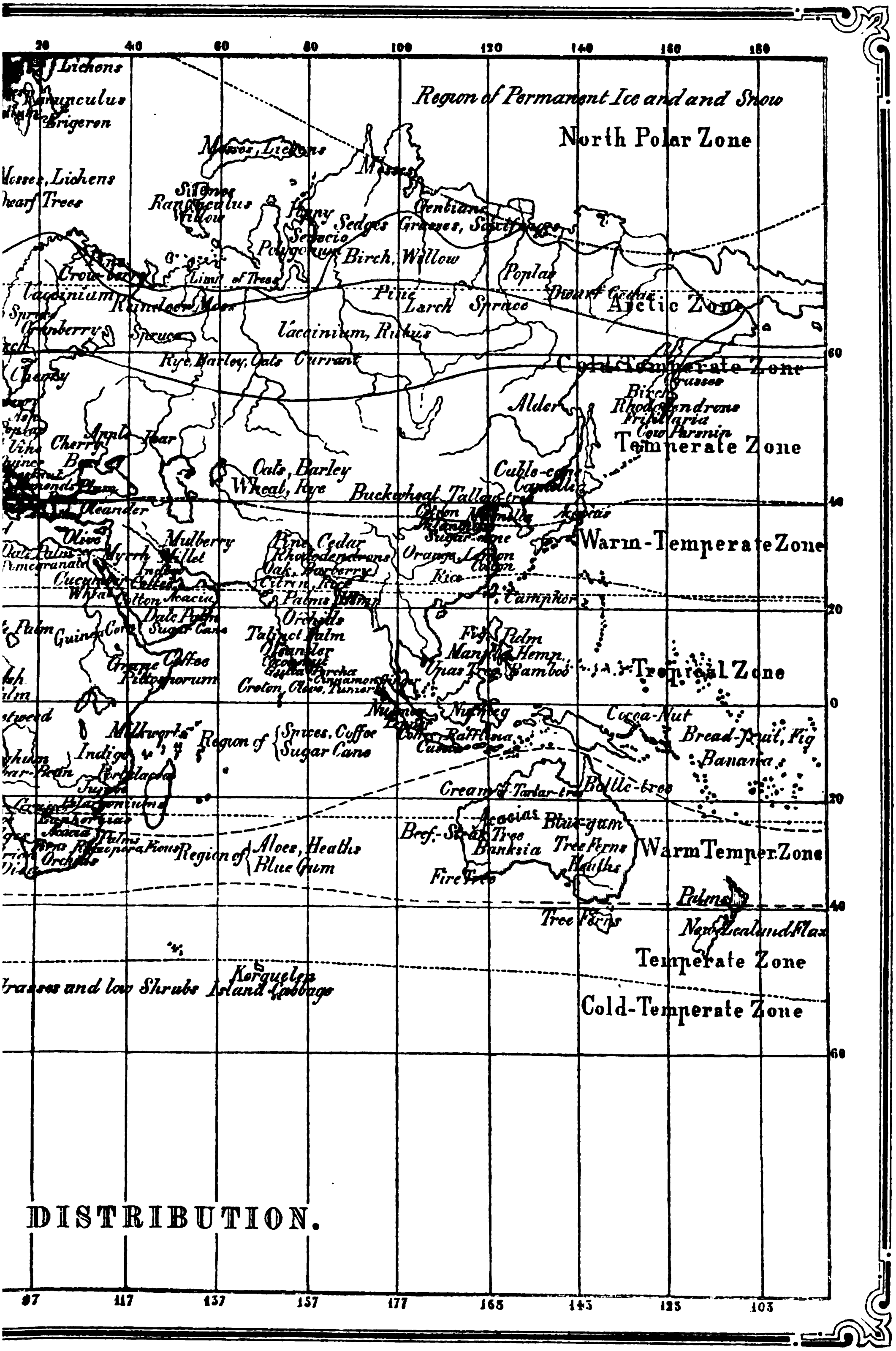


DISTRIBUTION.

group above orders is usually the division, of which in dicotyledonous plants there are three, viz., the polypetalous, monopetalous, and apetalous divisions; and in monocotyledons there are similar divisions founded on the relations of the floral envelopes to the ovary. Within these divisions the families are grouped in series and cohorts or alliances, bringing together those most nearly related in structure. —*Plant Distribution.* The distribution of plants upon the surface of the globe (geographical botany) forms a distinct and important department of botanical science, which can be merely glanced at here. The study of the distribution of plants as we now find them involves not only a knowledge of the requirements of each species, but of the geological and geographical changes which preceded the present epoch, and the various natural and artificial agents which have affected the distribution. In treating of germination it has been stated that while seeds will vegetate at a quite low temperature, and may endure a very high one, yet there is a certain point most favorable to each kind of seed. It is so throughout the whole life of the plant; a species may maintain its existence in an unnaturally low or high temperature, yet there is a degree of heat most favorable for each to perform its functions of vegetation and seed production; hence temperature is one of the chief agents in determining the distribution of plants. It is a well known fact in physical geography that latitude alone does not govern the temperature of a locality, but that altitude must be taken into account; on the Alps the harvest is 17 days later for each 1,000 ft. of altitude, and a similar rule holds elsewhere; it is a matter of common observation that as we go south in our own country, if we would find the common plants of the northern states in Georgia or North Carolina, we must seek them in the mountains. In general terms it may be said that each species requires a certain number of days to complete its career of vegetation and reproduction, and that during these days it requires a certain mean temperature; the mean temperature multiplied by the number of days gives the sum of heat the plant demands for its development; within certain limits, if the temperature be lowered, the time must be prolonged, or if the mean temperature of the days is higher, their number may be lessened; hence we find vegetation in high latitudes often remarkably rapid, and though the south of England is nearly 10° south of Upsal, Sweden, the wheat harvest in both localities takes place at the same time. As a general rule a plant will flourish, so far as temperature is concerned, wherever the sum of heat is sufficient for its needs; it is not necessary to state here the exceptions to this. Another important condition influencing plant distribution is moisture; the plants native to arid regions, such as the elevated plains of Arizona and New Mexico, are especially adapted in their structure to resist a drought of many months, and would die if taken to regions of frequent rains, as quickly as would plants from moister localities transferred to these plains. Certain plants that live only under the shade of trees are not found in treeless regions, nor are certain others met with away from the influence of the sea. Peculiarities of soil have also their influence on distribution, and there is as much difference between the plants of sandy and heavy soils and of calcareous and granitic ones as between those of swamps and dry hilltops. Some naturalists hold that all the plants of a particular species, as at present recognized, are descended from a single parent individual created "in the beginning;" others that there were several distinct but widely separated "centres of creation;" and others, with Darwin, that species as we now know them were derived from other and simpler "primordial forms." But whatever may have been the "origin of species" now upon the globe, the fact must be admitted that they have been transferred from the localities they occupied at first and become naturalized in others, for the distribution of plants is still going on. While according to De Candolle no single flowering plant is really a cosmopolite, he enumerates 117 which extend over more than one third of the earth's surface, and 18 which are found over one half of the globe. In contrast with those widely distributed species, there are many of very limited area; the Kerguelen cabbage, found only on the small island which gives its name, is an instance of this; and again plants of the same kind are found in localities so widely separated as to make it difficult to trace them to a common origin: *schizæa pusilla*, a very local fern in the pine barrens of New Jersey, was thought to be peculiar to them until it was found in New Zealand; and more than one of our rare plants in the northern states is found wild elsewhere only in the Himalayas or in Japan. Many of the natural methods of disseminating plants are now at work, and it is inferred that they were in operation in early times. The seeds of some plants are carried to long distances by ocean currents, though the number of seeds which can resist the action of sea water is found to be comparatively small; rivers do much more in the way of distributing seeds, as do casual mountain torrents; birds may carry aquatic plants long distances, attached to their feet, and birds of passage perform an important part in dissemination, voiding the undigested seeds at a great distance from the point where the fruit was eaten; quadrupeds do their share of the work, and many seeds and fruits are provided with hooks which allow them to be attached to the hair and skin of these animals. Man performs his part in the distribution; many plants (especially in the tropics) have escaped from cultivation and become so thoroughly naturalized as to appear as natives, and the weeds of agriculture are to be found in every settlement however remote. Wars have had their effect upon vegetation, and the passage of an army through a country leaves weeds in its train which were not there before. After our civil war a little leguminous plant, *Lespedeza striata*, sprang up all over the southern states; it is not known how it came or where from, but its native country is Japan, and in some localities as "Japan clover" it is valued as a forage plant. In a geographical classification, plants may be arranged in zones as regards latitudes, or in zones as to altitudes; or following Schouw, the globe may be divided into phyto-geographic regions founded upon the prevailing plants, such as the region of mosses and saxifrages, the region of palms and melastomas, &c. Besides these there are vast numbers of marine plants the distribution of which is marked by distinct bounds. The accompanying chart is designed to present at one view the prevailing vegetation of the different parts of the globe, and to give an idea of the geographical limits of the principal cultivated and economical plants.—*Bibliography.* In this sketch of the plant, only the leading points have been briefly treated, and some are necessarily omitted altogether. Naturalists are now much occupied in studying the relations of plants and insects, and the reader is referred for some account of these to the titles Insect Fertilization and Insectivorous Plants. Since the last named article was written, Sir John Lubbock's work, "British Wild Flowers considered in Relation to Insects" (London, 1875), has appeared, and gives many new observations. To aid those who would follow the subject of this article more in full, the following works are enumerated, as supplementary to the more extended list (mainly of systematic works) given under Botany. Plant structure and plant life are presented in a form attractive to young people by Prof. Asa Gray in "How Plants Grow" and "How Plants Behave" (New York, 1858 and 1872), and by Miss Eliza Youmans in her "First" and "Second Book of Botany" (New York, 1870-'73). The general reader will find Gray's "Lessons" (1868) sufficiently comprehensive, and his "Structural and Systematic Botany" is a thorough work suited to advanced students. The elaborate work of Le Maout and Decaisne, translated by Mrs. Hooker and edited by Dr. J. D. Hooker under the title "A General System of Botany, Descriptive and Analytical" (1873), has been referred to as the most recent work on classification; it is prefaced by a full and profusely illustrated treatise on structure. The student who would study the physiology of plants and their relation to the soil will find in Prof. S. W. Johnson's "How Crops Grow" and "How Crops Feed" (New York, 1868 and 1870) the most complete presentation of the subject. The literature has recently been enriched by a translation of Julius Sachs's *Lehrbuch der Botanik*, with the title "Text Book of Botany, Morphological and Physiological," by A. W. Bennett (London, 1875). The most complete work on the distribution of plants is A. de Candolle's *Géographie botanique raisonnée* (Paris, 1855). Darwin's "Origin of Species," "Variation of Plants and Animals under Domestication," "Fertilization of Orchids," and "Movements of Climbing Plants" are full of interest to the general reader and wonderful storehouses of facts for the student.

PLANTAGENET, the surname of the royal family of England from Henry II. to Richard III. inclusive. It belonged originally to the house of Anjou, and by most antiquaries is derived from the story that Foulques or Fulk, the first earl of that family, having committed some crime, went on a pilgrimage to Rome, where he was scourged with broom twigs (*plantagenistæ*), and from that circumstance assumed the name. It is now borne through collateral descent by the duke of Buckingham and Chandos.

PLANTAIN. I. A genus (*plantago*) of humble weed-like plants found nearly all over the globe, but most abundant in the temperate parts of the old world. It gives its name to the small family *plantiginaceæ*, which includes only two other genera. The plantains are stemless herbs with a tuft of spreading leaves, and in our species slender leafless flower stalks, upon which the whitish flowers are crowded in a small bracted spike or head; calyx with four sepals; corolla small, with a narrow tube and four-parted border, withering on the pod; stamens four (rarely two); pod two-celled, two- to several-seeded, and opening by a transverse line, the top falling away like a lid. The common plantain, *P. major*, is found almost everywhere around dwellings; its ovate or slightly heart-shaped leaves have five to seven strong ribs, and channelled petioles; its dense slender flower spikes are from 6 to 18 in. long, and are often placed in the cages of birds, which are very fond of the unripe and ripe seeds; the broad leaves have long had a popular reputation as a beneficial cooling application to bruises. This is one of the most thoroughly naturalized of all European weeds; it has followed the settler to the most remote parts, and is said to be called "the white man's foot" by the aborigines; a small and rough form grows in salt marshes. The native *P. cordata*, which resembles it somewhat, is rather rare along streams, especially southward.—The rib grass, *P. lanceolata*, also called ripple grass, buckhorn, and English plantain, is another extensively introduced species, and is abundant in meadows. This has lanceolate, three- to five-ribbed leaves, which are 4 to 10 in. long, and usually hairy; the channelled flower stalk is 1 or 2 ft. high with a short spike, which is at first ovoid, but later usually becoming cylindric. Most animals, especially sheep, are fond of its mucilaginous leaves, and in England it was formerly cultivated as a fodder plant; even at the present time the catalogues of the English seedsmen include it with various grass seeds in the mixtures they offer for seeding down permanent pastures; in this country it is regarded as a weed, and as its seeds are of the size of clover, it is one very difficult to keep clear of, though it is much less harmful than most weeds.

Common Plantain (Plantago major).

Among our native species is the seaside plantain, *P. maritima*, found all along the coast; its linear, fleshy, and almost cylindrical ribless leaves look very unlike those of the other plantains. *P. Virginica* is a hairy species found on sandy ground and dry hills, and *P. pusilla* is only 1 to 4 in. high, with thread-like leaves. *P. Patagonica* is a very variable species that has received a number of names; it is found nearly the whole length of North and South America, and is especially common westward. The seeds of an oriental species, *P. decumbens*, are found in East Indian bazaars under the Persian name of *ispaghul;* they have much the same appearance as the seeds of other plantains, but when held in the mouth give off an abundant mucilage, without taste or odor; one part of the seeds to 20 parts of water forms a thick jelly, and one part to 70 of water yields a mucilaginous drink much used for dysentery and other affections of the bowels; they have been in use for several centuries, and are employed by the European physicians in India as a demulcent.—Since naturalists have turned their attention to the provisions for securing cross fertilization among flowers by the aid of insects and otherwise, these humble weeds have possessed a new interest, as they furnish excellent examples of dichogamy, *i. e.*, the stamens and pistils of the flowers coming to perfection at different times. In the common and ribwort plantains the long and hairy style is protruded from the apex of the closed bud, to be fertilized by pollen from other flowers, for a day or two before its own stamens are ready; and by the time these are hung out upon their long filaments, fertilization has already taken place or the stigma is too dry to receive pollen from its own flowers. **II.** A banana-like fruit, the produce of *musa paradisiaca.* Though different specific names are applied to the plantain and banana, the plants are probably mere varieties; the former lacks the purple spots upon the stems of the other, and has a longer and more angled fruit. (See BANANA.)

PLANTAIN EATER, the name of the *musophaginæ*, a subfamily of conirostral birds, inhabiting Africa, and living chiefly upon the fruit of the plantain. In all the genera the bill is strong, broad at the base, curved, with notched tip; wings short; tail long and broad; tarsi and toes strong, the outer one capable of being directed backward; this last, however, is denied by Swainson. In the genus *musophaga* (Isert) the bill is large, with the culmen much advanced on the forehead; fourth and fifth quills the longest, and the tertials long and broad; tail rounded; orbital region naked. The violet plantain eater (*M. violacea*, Is.) is 20 in. long, of a beautiful shining purplish black; crown and quills crimson, on the last with a lilac tinge; bill bright yellow, passing into crimson at the tip, light and semi-transparent; a white stripe beneath the eye. It is found on the Gold coast. In the genus *turacus* (Cuv.), or *corythaix* (Ill.), the bill is short and high, with the lateral margins finely serrated; wings short, the fourth to the seventh quills the longest; outer toe versatile; orbital region naked, and head with movable crest. The Senegal plantain eater (*T. purpureus*, Less.) is about 16 in. long, of a glossy purple, with the head, neck, breast, and crest green; orbits naked and red; white stripe over the eye, and a black one beneath; it is very shy, and difficult to shoot, from its frequenting the highest branches of the tallest trees; it is restricted to the W. coast of tropical Africa. Several other species are described in Africa, all shy and handsome.—The American subfamily *opisthocomidæ* is placed in the same family by Gray;

Plantain Eater (Turacus purpureus).

the characters are essentially the same, except in the incapability of turning the outer toe backward. It embraces the single genus *opisthocomus* (Hoffm.), and the single species *O. cristatus* (Lath.) or the hoazin; this is about 18 in. long, greenish above, with longitudinal white stripes on the back of the neck and shoulders; the forehead and long crest chestnut, as well as the primaries and abdomen; breast lighter, with an orange tint; secondaries and tertiaries edged with white; tail long, green tipped with light buff; bare space round eyes blue, legs red, and bill yellow. It lives in small flocks on the banks of the rivers of Brazil and Guiana, feeding chiefly on the leaves of the *arum arborescens* (Linn.), which give to the flesh a musky odor rendering it unpalatable. This singular bird was placed by Linnæus and by many later authors among the gallinaceous birds, which it resembles even in its gait; it is now ranked among the perchers.

PLANT CUTTER, a conirostral bird, the type of the subfamily *phytotominæ*, by some placed with the finches and by others with the chatterers. In the single genus *phytotoma* (Mol.) the bill is short, strong, conical, broad at the base, with arched culmen and lateral margins finely serrated; wings moderate, the quills from the third to the fifth equal and longest; tail moderate and even; tarsi strong, shorter than the middle toe, and covered with transverse scales; toes long and slender, hind one long, and all armed with curved claws; the intestine is short, an exception to the rule in vegetable feeders. Only a few species are described, in temperate South America, in woody and dry regions, often visiting cultivated fields; they live in pairs or in small flocks, and do considerable mischief in orchards and gardens by cutting off buds, fruits, and plants with their serrated bills, destroying, as if in mere wantonness, much more than is required for food; they also eat insects. The flight is short and low, and the notes very disagreeable, resembling the grating of the teeth of saws rubbed over each other. The best known species is the *P. rara* (Mol.) of Chili; it is about the size of a thrush, brown above, each feather edged with lighter; top of head rufous brown, which color prevails in the lower parts; tail rufous, with a terminal dark brown bar; wings dark brown, the primaries with a white bar, and the wing coverts edged with the same. The nest is made in high trees.

Plant Cutter (Phytotoma rara).

PLANTIGRADES, a division of carnivorous mammals, so named because the whole foot, including the tarsus and metatarsus, is applied to the ground in walking. The toes are longer than in the digitigrade division, the form heavier, and the diet more vegetable; they have a greater facility for raising themselves on their hind feet, for clasping, climbing, and digging; the small extent of the lumbar region renders them less supple and agile; they are generally slow in their movements, and nocturnal in habit. The distinctions between these divisions are not entirely definite, and some animals are intermediate between the two, and therefore semi-plantigrade; these divisions may be represented respectively by the bears, the dogs and cats, and the civets and weasels. Besides the bears, the plantigrades embrace the glutton or wolverene, badger, raccoon, coaiti, kinkajou or potto, and the panda or wah.

PLANT LOUSE. See Aphis.

PLAQUEMINES, a S. E. parish of Louisiana, at the extremity of the state, bordering on the gulf of Mexico, and including the delta of the Mississippi, by which it is intersected; area, about 1,000 sq. m.; pop. in 1870, 10,552, of whom 6,845 were colored. It has a low and level surface, nowhere more than 10 ft. above the gulf, and a large portion is occupied by marshes. The chief productions in 1870 were 55,280 bushels of Indian corn, 7,723 hogsheads of sugar, 421,562 gallons of molasses, and 8,639,026 lbs. of rice. There were 914 horses, 1,648 mules and asses, 1,116 milch cows, 2,236 other cattle, and 1,111 swine. Capital, Point à la Hache.

PLASSEY, Battle of. See Clive.

PLASTER OF PARIS. See Gypsum.

PLATA, La. See Argentine Republic.

PLATA, Rio de la (Silver river), a river (or more properly an estuary) of South America, between Uruguay and the Argentine Republic, having Montevideo, the capital of the former, on its N. bank near the entrance, and Buenos Ayres, the capital of the latter, on its S. bank near the head. It is formed by the junction of the Paraná with the Uruguay, whose waters empty through it into the Atlantic. From the confluence of these rivers to about 120 m. below it has all the distinctive features of a fresh-water estuary; it then widens abruptly into a bay, 130 m. wide and 50 m. long, to a line drawn from Este point to Rasa point, the N. E. and S. W. limits of the entrance, where the water discharged by the rivers begins to mingle with the ocean. The estuary has a general direction of N. W. by W. and S. E. by E., and its width varies from 55 to 21 m. The northern coast is rocky, elevated, and undulating; the southern, low, marshy, and of uniform height. Bordering the former are the Sierra de las Ánimas and the Pan de Azúcar, 15 m. within the entrance; the Monte, an isolated pyramidal hill, 50 m. within, from which Montevideo derives its name; and the triple cerro of San Juan, near the head of the estuary. The southern coast is the termination of a vast marshy plain, which constitutes a considerable part of the state of Buenos Ayres. The bed of the Plata is of rock, covered with alternate layers of sand and mud of varying thickness. In a few places the rock rises to the surface, and extensive sand banks and shoals contract the navigable space. Of these the shoalest and most dangerous is English bank, which is chiefly rock. Among the others are the Ortiz, Archimedes, French, Chico, and Astrolabe banks, all of sand; and the Cuirassier and Piedras, composed of a kind of hard mud or rotten stone called *tosca*. A comparison of the most recent with the earliest surveys demonstrates that the general direction of the channels is the same, but the form and dimensions of the banks have changed. Within the past 15 years the sands have been washed away from the Cuirassier, and the Ortiz has been prolonged 12 m. S. E. The average depth of the Plata has decreased, but that of the channels appears to remain the same. This diminishes from 15 fathoms in the entrance to 5 fathoms opposite Montevideo; thence to Buenos Ayres there is a minimum depth of 20 ft. in the channels; and across the flats in the head of the estuary the deepest channels have only 13 ft. in ordinary stages of the tide and rivers. Three islands only are found within the limits of the Plata: Gorriti, just within the entrance, a mile long and a quarter of a mile wide; Flores, 45 m. within, three quarters of a mile long and a quarter of a mile wide; and Martin Garcia, a mass of granite in the head of the estuary, about two miles in circumference, rising in the form of a flattened cone to an elevation of 190 ft. The position of this island, between and commanding the only channels leading from the Plata to the rivers accessible to large vessels, renders it a strategic point of great importance. By a treaty signed in 1858 between the Argentine Republic and the United States, the two nations agree to use their power to prevent the island from being retained by any state which shall not adhere to the principles of the free navigation of the rivers. Bordering the northern coast are several islets and rocks, of which a cluster near Colonia is the largest. Floating islands, called *camelotes*, are frequently met with in the estuary, and occasionally some distance at sea. They are detached from the low lands bordering the rivers, held together by roots, and on them are sometimes found specimens of the beasts and reptiles which inhabit the Gran Chaco. From one which stranded a short distance above Martin Garcia island, a jaguar of extraordinary size was captured in 1870. The tides and currents of the waters of the Plata follow no regular law, being greatly influenced, if not entirely created, by the prevailing or approaching wind. This is the result of its peculiar shape and shallowness. A rise or fall of the waters, accompanied by violent currents, frequently occurs without any apparent cause. The mean difference of level is about 9 ft., the maximum 20 ft. within the limits of the estuary. The navigation of the Plata is attended with much risk. Some lights have been established, but not enough. The estuary contains no port which is secure in all weathers; and numerous wrecks and great loss of life have resulted from this want. The basin of the Plata drains an area estimated at 1,200,000 sq. m., and affords about 10,000 m. of inland navigation. The movement of shipping in the river is now (1875) about 4,000,000 tons per annum, and the value of imports and exports about $140,000,000. The fish caught in the Plata are not suitable for food. The hair seal abounds in the bay, and is caught for the hide and oil.—The discoverer and date of discovery of the Plata remain in doubt. The brothers Pinzon appear to have arrived within its limits in 1508; but Juan Diaz de Solis was the first to enter it, in 1512. After a short stay his vessels were driven to sea by a gale, and he returned to Spain to report the discovery. Solis revisited the estuary in 1516, and was murdered by the natives, near a small stream which now bears his name. He called the estuary Mar Dulce; after his death it was called Rio de Solis until the exploration of Sebastian Cabot in 1527, who named it Rio de la Plata, believing it to be the long sought route to El Dorado.—See "Argentine Republic, Handbook of the River Plate," by M. G. and E. T. Mulhall (New York, 1869), and "The Rio de la Plata," by Lieut. Commander Henry H. Gorringe, U. S. N. (published by government, Washington, 1875).

PLATÆA, or **Platææ**, an ancient city of Bœotia, on the boundary of Attica, at the foot of Mt. Cithæron, about 7 m. S. by W. of Thebes. The Platæans claimed to derive their name from Platæa, a daughter of Asopus, and their city was one of the oldest of Greece, being mentioned by Homer. The Thebans said that they had founded the city, but in 519 B. C. Platæa, unwilling to acknowledge their supremacy, allied itself with Athens. A thousand of its citizens participated in the battle of Marathon (490). In 480 the city was burned by the Persians, and in 479 was fought the battle of Platæa. (See GREECE, vol. viii., p. 190.) For the victory gained on their soil, the confederate Greeks granted the Platæans 80 talents, and charged them with the duty of paying annual honors to the tombs of the fallen warriors, and of celebrating every five years the festival of the Eleutheria; and in return the independence and inviolability of their territory were guaranteed. In 431 the Thebans made an unsuccessful attempt to seize Platæa; and later the city, defended by 480 men, held out against the Lacedæmonians from 429 to the summer of 427, when want of provisions compelled a surrender, after which it was razed to the ground. It was rebuilt after the peace of Antalcidas, but was again destroyed by the Thebans in 374; was once more rebuilt by the Macedonians in 338, and is spoken of in the 6th century A. D. by Hierocles as one of the cities of Bœotia. Its ruins are still traced near the village of Kokla.

PLATED WARE, articles of various kinds, consisting as a rule of a cheap metal as a base covered with one of more value, as britannia metal, nickel, copper, or brass covered with silver or gold, or iron with nickel. There are two distinct methods of plating: an older one by which the silver was either soldered or fused upon the foundation metal, and a newer one of depositing the coating from a solution of a metallic salt by electro-chemical decomposition. Attaching sheets of silver by means of solder was practised by the ancient Romans, and continued in general use till the middle of the 18th century. The process is called by the French *le doublé* or lining, and the English call it French plating to distinguish it from the method which followed it, called the English method, which consisted in fusing a plate of silver upon an ingot of copper or brass without the intervention of solder, and then rolling the ingot into a sheet, This method is also called true plating, and was introduced into France about the year 1808. In 1839 it gave employment to some 2,000 workmen, the products of whose labor amounted to about 8,000,000 francs. The metal to be plated may be either very fine copper or a brass containing a very large proportion of copper. The nickel alloys of copper, though preferred for electro-plating, do not answer for the older process because the surface is liable to oxidation, by which the silver is prevented from adhering. An ingot of copper or brass, or a mixture of the two, is cast about an inch thick, 3 in. broad, and 18 or 20 in. long. It must be free from holes or flaws, to insure which it is cast in an iron mould with rising mouthpieces to give pressure and allow impurities to float up. The surface of the ingot is smoothed with a file, and a plate of silver is laid upon the surfaces to be plated equal to $\frac{1}{30}$ or $\frac{1}{24}$ of the weight of copper for each side to be covered. The plate or plates are fastened on with iron wire and the edges sealed with a little borax. It is now placed upon burning coke in the plating furnace and watched by the workman through a small hole in the door. The proper temperature of the ingot is indicated by the silver being drawn into contact with the copper. It is then removed as quickly as possible, for the two metals are then just ready to run together and form an alloy, and in fact they do this at their surfaces of contact; the rapid cooling of the surface which follows exposure to the air arrests the process. Being now cleaned, the ingot is reduced to a sheet of the required thickness by several rollings, between each of which the ingot must be annealed to preserve its ductility. After the last annealing the sheets are immersed in hot dilute sulphuric acid and covered with fine Calais sand. They are then ready to be formed into articles by raising with the hammer, spinning on the lathe, stamping, chasing, &c. The plated wire used for making bread baskets and other light open-work utensils is made by first fashioning silver tubes by lapping sheets around a rod, then placing the cleaned tubes upon clean copper rods and heating them in a furnace, whereby the surfaces of contact are united by the formation of a film of alloy, a burnisher being used to press them together, after which the plated rod is drawn into wire of the desired size.—The newer process of electro-plating has mostly superseded these older ones, and all housekeeping plated ware is now made by forming the articles in copper bronze, nickel, britannia, or white metal, and then depositing upon them the silver or the gold, from a solution of cyanide of the metal, after which the surfaces may be burnished and otherwise embellished. This art is extensively practised in Europe and America. Some fine ware is made by depositing a thick coating of silver upon nickel, which, although much cheaper, has in every respect the appearance of real plate. The general principles of electro-plating and electro-gilding (as the covering with gold is technically called) are given in the article GALVANISM. The details of the operations vary with different cases, and can only be intelligibly described or well understood in the work room. Nickel plating is described in the article NICKEL.

PLATEN, August, count, a German poet, born in Anspach, Oct. 24, 1796, died in Syracuse, Sicily, Dec. 5, 1835. He served against France in the Bavarian army, and subsequently acquired celebrity as a poet, especially by his *Polenlieder* and by his dramas *Die verhängnissvolle Gabel* and *Der romantische Oedipus.* His complete works have been published in 5 vols. (Stuttgart, 1847 and 1853), and his *Poetischer und literarischer Nachlass,* edited by Minckwitz, in 2 vols. (1852).

PLATH, Johann Heinrich, a German sinologue, born in Munich in 1807, died there, Nov. 16, 1874. In 1848 he became state librarian. His works comprise *Confucius und seiner Schüler Leben und Lehren* (2 vols., Munich, 1867–'72); *Die Beschäftigungen der alten Chinesen* (1869); *China vor* 4,000 *Jahren* (1869); *Die Quellen der alten chinesischen Geschichte* (1870); and *Geschichte der Völker der Mandschurei* (4 vols., 1874), of which he left the fifth and last volume in manuscript.

PLATINUM (Sp. *platina,* little silver), a grayish white metal, distinguished by its great specific gravity and difficult fusibility, discovered by Wood, an assayer of Jamaica, in 1741. It occurs in the native state alloyed with palladium, rhodium, iridium, osmium, and ruthenium, and a little iron, in the form of small flattened grains; sometimes in larger nodules, alloyed with gold and traces of silver, and with copper, iron, and lead. It is found in alluvial districts, in the debris of the earliest volcanic rocks, on the slopes of the Ural mountains in Russia, in Brazil, Santo Domingo, Borneo, Ceylon, California, and Australia. In Nizhni Tagilsk, Ural mountains, it has been found with chromite in serpentine. Russia affords annually about 800 cwts. of platinum, which is nearly ten times the amount derived from Brazil, Colombia, Santo Domingo, and Borneo; the yield from Borneo is from 600 to 800 lbs. annually. It has been found in the sands of the Rhine; at St. Aray, valley of the Drac, in the French Alps; in the county of Wicklow, Ireland; in Honduras; in Rutherford co., North Carolina; and at St. François Beauce, in the province of Quebec. Although almost always in small grains, it has been found in masses of considerable size; one weighing 1,088 grains, and having a specific gravity of 18·94, was brought by Humboldt from South America and deposited in the Berlin museum. In 1822 a specimen from Condoto was placed in the Madrid museum which was $2\frac{1}{8}$ in. in diameter and weighed 11,641 grains. A mass was found in 1827 in the Ural which weighed $10\frac{9}{16}$ Russian pounds, or 11·57 lbs. troy. The largest mass ever found weighs 21 lbs. troy, and is in the Demidoff cabinet. The grains of native platinum usually contain from 75 to 85 per cent. of the pure metal.—The extraction of platinum is somewhat difficult, the ordinary method being that devised by Wollaston, which is as follows. The lighter impurities are separated by washing, and the washed ore is first digested in nitric and then in hydrochloric acid, to remove the more easily oxidizable metals. It is then digested at a moderate heat in nitro-muriatic acid containing an excess of hydrochloric acid, and slightly diluted in order to dissolve as little iridium as possible. The yellowish red acid solution is then decanted and treated with sal ammoniac dissolved in five times its weight of water, which precipitates the metal in the form of a yellow double salt, ammonium platino-chloride, $2H_4NCl, PtCl_4$, which, being washed in cold water, dried, and heated to redness, is reduced to the metallic state as a spongy mass. It cannot be fused into a compact mass by a furnace heat alone, but as it possesses the property of welding like iron, it may be reduced to a compact state when hot by hammering, which is a part of Wollaston's process. Deville and Debray employ fusion in a lime crucible by the oxyhydrogen blowpipe, to remove traces of osmium and silicon. They have also introduced an entirely new method of extraction, employing fusion instead of the wet way. A small reverberatory furnace, having a cup-shaped bed of fire brick lined with clay, is heated to full redness and charged with a mixture of equal parts of platinum ore and galena, introduced in small quantities and stirred with an iron rod, while a little glass is thrown in to act as a flux, and afterward by degrees a quantity of litharge equal to that of the galena used. In this way the sulphur is oxidized and expelled, and the lead of the galena and litharge forms a fusible alloy with the platinum. The melted mass is now left to stand till the osmium and iridium fall to the bottom, they not being alloyed by the lead, when the lead and platinum alloy is cautiously taken out with iron ladles, and submitted to cupellation in the ordinary manner, after which the crude cupelled platinum is refined by the oxyhydrogen blowpipe on a bed of lime. The alloy of platinum, iridium, and rhodium is harder and withstands a higher heat than pure platinum, and for that reason is better adapted for making crucibles. —The symbol of platinum is Pt; its atomic weight, 106·5; specific gravity, 21·5. It resists the highest heat of the forge, but melts in the voltaic arc and before the oxyhydrogen blowpipe, and may be volatilized with scintillations. Its crystalline form as found native is that of the octahedron, but all attempts to produce artificial crystals have failed. It expands less by heat than any other metal, and is much inferior to silver, gold, and coppér as a conductor of electricity, ranking near iron, as is shown by the readiness with which a small wire is ignited by the galvanic current; this property is made use of in firing explosive compounds. It does not oxidize in the air at any temperature, nor is it attacked by any one acid; but if heated to redness in the air in contact with caustic alkalies or alkaline earths, a hydrated oxide is formed which combines with the alkaline base, in a similar manner to palladium. Platinum possesses the property of causing the union of oxygen with hydrogen and other combustible gases, even in the compact form, but more highly in the spongy state, and still more so as platinum black. The metal may be obtained in this latter form in several ways, of which the following is one of the most convenient. A solution of chloride of platinum is boiled with an excess of carbonate of soda, to which a quantity of sugar has been added, until the resulting precipitate becomes black. Chloride of sodium is formed, water and carbonic acid are produced by oxidation of the sugar, and the platinum is precipitated, so finely divided that it appears black. This powder is then collected on a filter, washed, and dried by a gentle heat, when it is found to have the power of condensing gases, especially oxygen, in its pores to a remarkable extent. It almost instantaneously converts alcohol into acetic acid, often with sufficient rise of temperature to cause combustion. It also converts wood spirit into formic acid. The unalterability of platinum at high temperatures, and its power of resisting the action of most chemical agents, render it useful for crucibles, evaporating dishes, forceps and foil for blowpipe experiments, and for other chemical and philosophical apparatus. Large platinum stills, sometimes weighing 2,000 oz., are used for the concentration of sulphuric acid. It was made into coin by the Russians to the amount of $2,500,000 between 1826 and 1864, when the coinage was discontinued. It is sometimes used for the touch-holes of fowling pieces. Platinum forms alloys with most other metals, which are generally more fusible than the pure metal, the exceptions being with iridium and rhodium. Care must therefore be taken not to use platinum crucibles for melting other metals. Most of the platinum of commerce contains iridium, which increases its hardness and durability, without impairing its power of resisting chemical agents. Although when pure it is perfectly insoluble in nitric acid, when alloyed with 10 or 12 times its weight of silver it is with the latter metal easily dissolved by this acid. Hot oil of vitriol will dissolve out the silver. —Platinum forms two series of compounds, the platinous, in which it is bivalent, and the platinic, in which it is quadrivalent, being similar to palladium. The dichloride, or platinous chloride, $PtCl_2$, is formed when platinic chloride, $PtCl_4$, formerly called bichloride, is exposed in a dried and powdered condition to a heat of about 392° F., by which half of the chlorine is expelled. It is an olive-colored powder, insoluble in water, slightly soluble in nitric or sulphuric acid, but readily in hydrochloric acid when warmed. It is soluble in caustic potash, and in platinic chloride, forming with the latter a double salt. The solution in hydrochloric acid, when treated with an alkaline chloride, deposits a double salt in fine red prismatic crystals, the potassium salt having the formula $2KCl,PtCl_2$. These double salts are called chloroplatinites or platinosochlorides. The tetrachloride, or platinic chloride, $PtCl_4$, is formed by the action of nitromuriatic acid on metallic platinum in which the nascent chlorine has sufficient affinity to combine with the metal. The acid solution when evaporated to dryness yields a deliquescent red-brown residue, which is very soluble in water and in alcohol, the aqueous solution having a pure orange-yellow tint. Platinic chloride unites with many metallic chlorides, forming double salts, called chloroplatinates or platinochlorides, the most important being those formed with the alkaline metals and ammonium. Potassium platinochloride, $2KCl,PtCl_4$, is formed whenever solutions of chlorides of potassium and platinum are mixed, as a bright yellow precipitate, and on this account platinic chloride is used in the laboratory as a test for potassium compounds. The other salts of platinum, as the iodides, bromides, and cyanides, are of less importance. There are two oxides: a protoxide, prepared by the action of caustic potash on platinous chloride; and a dioxide, obtained by adding sodic carbonate to platinic nitrate. The quantity of platinum in a compound or mixture is estimated by causing the formation of double salts of chloride of platinum with potassium or ammonium. The addition of alcohol favors the formation of the precipitate.

PLATO, a Greek philosopher, born in Athens (or according to some authorities in Ægina) about 429 B. C., died about 348. His father Ariston traced his descent to Codrus, and his mother Perictione reckoned Solon among her ancestors. His original name was Aristocles, derived from his grandfather; but it was altered to Plato (Gr. πλατύς, broad), whether from the breadth of his forehead, his shoulders, or his diction, is not determined. Owing to his subsequent renown a parentage from Apollo was attributed to him, and bees settling on his infant lips were said to have betokened the honeyed sweetness of his style. Besides the ordinary training in gymnastics, grammar, and music, he was initiated by Cratylus into the doctrines of Heraclitus, and the study of Anaxagoras gave him the results of the pre-Socratic physics. The exuberant fancy which he subsequently lavished on dialectics at first overflowed in poetical compositions, epic, lyric, and dramatic. But he burned his epics on comparing them with Homer, and having in his 20th year fallen under the influence of Socrates, he thenceforth devoted himself to philosophy as that essence and soul of harmony of which rhythmical numbers are but the sensuous and shadowy embodiment. He was a pupil of Socrates during the last eight or nine years of that great reformer's life, and became thoroughly imbued with his profound ethical spirit, and master of his searching and potent dialectics. Plato alone, of all the disciples of Socrates, seems fully to have appreciated the intellectual greatness and seized the profound scientific conceptions of his master; and hence, while others, looking at single aspects of the Socratic teaching, framed one-sided systems which rather caricatured than adequately represented it, Plato developed its germs in all their fulness and fruitfulness; and his works are not more a product of his own genius than a tribute to the memory of his master. After the death of Socrates, Plato repaired to Megara, where Euclid, a former fellow disciple, had opened a school in which he sought to engraft the Socratic ethics on the stock of Eleatic idealism. To the ideas and impulses here acquired we owe very probably that group of dialogues in which Plato seeks to establish, against the Heraclitan doctrine of absolute multiplicity and the Eleatic assumption of absolute unity, the true idea of science. From Megara he visited Cyrene, Egypt, Magna Græcia, and Sicily. Of alleged journeys to Palestine, Babylon, Persia, India, &c., there is not the slightest evidence; and even of any philosophical fruits of his sojourn in Egypt his writings indicate but the faintest trace. In the Greek cities of lower Italy, however, where Pythagoreanism had its native home and still mainly flourished, he became more thoroughly conversant with the tenets of that philosophy. Hence in part probably his fondness for mathematical physics, for mythical and allegorical imagery, and possibly for political speculation, while its fundamental doctrine of unity developing itself in multiplicity furnished an admirable solution of the conflict between the Eleatic and the Heraclitan doctrines. Plato's general mode of philosophizing was in antiquity regarded as strongly Pythagorean. After about 12 years of foreign residence and travel he returned to Athens, and opened a school in his garden near the Academy, where he expounded his doctrines in conversation and formal lectures to a large number of pupils, among whom were women disguised as men. He also devoted a portion of his time to composing and revising his works. His life thus flowed on in an even tenor, broken only by two visits to Syracuse, neither of them attended by very flattering results. One was made apparently in the vain hope of realizing through the newly crowned younger Dionysius his ideal republic. Plato never married, never mingled in public affairs, and seems to have regarded the constitution and character of his native city with disfavor and almost despair. He spent a tranquil old age, his mental faculties to the last scarcely perceptibly decayed.—The writings of Plato have come down to us in a state of unusual completeness and purity. The genuineness of many of the pieces which bear his name has been disputed, but in the case of most of them with little approach to unanimity on the part of the assailants. A few of the smaller pieces, together with the letters, are undoubtedly spurious, but the genuineness of all the more important works there is no good reason to doubt. They are all in the form of dialogues; in nearly all Socrates is the chief speaker, and the exponent of the author's sentiments. Their composition extended over a large part of his life, and they are probably to be regarded rather as marking different stages of his philosophical development, than as expositions of a perfectly matured and rounded system. The methods of philosophy Plato seems to have settled with great definiteness; but in regard to the subject matter to which those methods were applicable, he to the last regarded himself as an inquirer. Numerous attempts have been made to arrange his dialogues on some clear principle of classification, either logical or chronological. Aristophanes of Byzantium arranged a part of them together in trilogies; and Thrasyllus, in the time of Tiberius, divided the whole number into tetralogies, which arrangement has been adopted by K. F. Hermann in his edition of Plato's works (1851). No one of these plans or modes of arrangement, however, has been entirely successful or acceptable to scholars. The dialogues bear no clear internal marks of the time when they were written, and they usually admit no sharp division according to their contents. We may perhaps most satisfactorily class them according to the leading epochs in the life of Plato. Thus some of the smaller dialogues on specific ethical points may be referred to his first or more strictly Socratic period. To his residence in Megara we may refer, doubtless, the noble tetralogy of "Theætetus," the "Sophist," the "Statesman," and "Parmenides;" and finally, to the period of his establishment in the Academy those noble compositions, "Phædrus," the "Symposium," "Gorgias," "Phædo," "Philebus," the "Republic," "Timæus," and the "Laws;" though in what order it is impossible to decide, except that we may naturally regard "Phædrus" as the earliest work of this period, while the "Laws," by unanimous consent, is among the latest. Plato is one of the most fascinating writers that ever undertook to expound the enigmas of philosophy. He spreads the charms of an exhaustless fancy over the subtlest controversies of the dialectician. He is at once poet and philosopher, with no small measure of the sweet flow of diction, the richness of invention, the exuberant imagery, the never failing vivacity, and we may add the garrulity, of Homer. One of the highest charms of his writings is their thoroughly dramatic character; they are dialogues not merely in form but in spirit. A light, buoyant humor, irony, sarcasm, banter, now broad and now delicate, picturesque illustration, and occasionally elaborate and gorgeous fable, alternate with and relieve the stern dialectical processes. It is necessary to any exposition of the philosophy of Plato to keep in view his historical position. The field of science had received as yet no formal divisions, but the several schools before Socrates had, each for itself, sought to solve the problem of universal being. Socrates discarded the whole body of these speculations as aiming at what was unattainable, and worthless if attained. He threw himself entirely on questions of political and personal morality, as those which alone had an immediate interest for man, and investigated these by that searching process of question and answer in which he sought to draw forth an exact conception of the subject, and to distinguish it from all related or unrelated ideas. Definition and generalization were the essential elements of the Socratic method, which Plato adopted to the full and developed scientifically. But he readmitted those elements of speculation which Socrates had discarded, bringing to bear upon them his new dialectical weapons, and thus made his system the embodiment and representative of all the wisdom of his time.—Plato makes no formal division of science. He evidently, however, regards it substantially under the threefold division of dialectics, physics, and ethics or politics. Dialectics, which with Aristotle became the mere instrument of science, logic, was with Plato the science of sciences, the science of absolute being. Physics and ethics are sciences only so far as they connect themselves with dialectics. Strictly speaking, therefore, dialectics covers the whole field of philosophy, while speaking in a looser way it appears as one single, though far the most important branch of it. Mathematics he does not regard as a science, but a help to science, lying midway between its absolute verities and the uncertainties of opinion. Dialectics, as the science *par éminence*, deals only with the absolute and invariable. Its subject matter consists of those transcendental, spiritual essences which Plato calls forms, species (*εἴδη*), improperly known as ideas. It is easy to say in a general way what these forms are. They are the eternal, immutable essences, removed from the sphere of sense, and cognizable only by the reason. They pervade the sensible world, being as it were the substance of which it is the shadow, giving to it whatever of partial reality it possesses. They thus answer undoubtedly as near as may be to the intuitions and general concepts of modern metaphysics, and they are now more generally explained as mere abstractions, universals, the product exclusively of the mind, and having no objective reality. Earlier scholars held them to be veritable, objective existences, subtle, half spiritual, and discerned directly by the eye of the soul, as sensible objects are by the eye of the body. Much as there is in Plato which gives plausibility to the more modern view, we yet incline decidedly to the realistic doctrine of former interpreters. The ideas or forms of Plato grew out of his strong conviction of the non-reality of matter. He adopted fully, in regard to the phenomenal world, the Heraclitan doctrine of the perpetual flow of all things. Thus, denying the reality of matter, which never is, but is always becoming, he would have denied equally the possibility of forming a science by generalizations from matter. It could have been but the shadow of a shadow. The same thing is shown by the relation of Plato's doctrine to the Eleatics. The Eleatics were not idealists in the modern sense of the term. Their absolute One was not a mere abstraction, a creature of the mind, but the totality of the objective universe, as discerned by the soul or the reason, itself but a subtler species of matter. It is doubtful if there was any pure idealism in antiquity. Again, the way in which we become acquainted with the "forms" proves their objective and real character. Were they mere intuitions or generalizations, we could arrive at a knowledge of them by those processes of abstraction and generalization to which the mind is abundantly competent. But such was not the case. The soul enshrined in the body could not, according to Plato, possibly arrive at this knowledge. It must have acquired it in a state anterior to the present, when, disembodied, it stood face to face with these essences kindred to itself, and communed with them as the bodily sense here holds converse with the elements of matter. Thus all learning is with Plato merely reminiscence, the knowledge which the soul had in its anterior state being called up by the action of the senses upon the phenomenal world, in whose pictured semblances the soul learns to recall the features of the divine original. And that this doctrine of preëxistence and reminiscence is no mere poetic fiction or imaginative symbol is shown by the severity of the process which he employs in demonstrating it, and the high practical purpose to which he applies it. In order to establish the doctrine of preëxistence he employs one of the sharpest psychological processes in his entire works. He distinguishes between ideas drawn from the sense and those conceptions which sense never could furnish, but which exist in the mind from the very commencement of our earthly being, as standards to which our sensible perceptions are all referred, and which consequently it must have brought with it from an anterior state. And in thus establishing the existence of the soul before coming into the body, he establishes its independence of the body, and by consequence its immortality. He reasons from the past to the future, and by showing that the soul is not dependent for its existence upon the body, he shows that it is not affected by the dissolution of the body. Preëxistence, the ideas or forms, and immortality are thus all woven into one indissoluble web of argument, of which the ideas are, as everywhere in his system, the central point. We hold, therefore, to the middle-age realistic views of the Platonic forms or ideas, and the attempt to reduce them to the standard of the Scotch or French metaphysics of our own day is to ignore Plato's historical position, and lose sight of the peculiar problems of Grecian speculation. Of course it is impossible but that Plato, in applying to these assumed realities his sharp dialectical methods, should be sometimes inconsistent with himself, and resolve the objective essences into the subjective conceptions for which they really stand. And as these transcendental forms are the essence of all reality, and the end of all true knowledge, it follows that the soul's residence in the body is an evil, that the phenomena of sense, interposed between the mind and these absolute existences, are constantly deceiving and alluring it from its proper element. The great business of the philosopher, therefore, is to emancipate himself as far as possible, not only from the dominion of the animal appetites, but also from the illusions of sense, and to retire into that interior world of reflection in which his mind can commune with its kindred eternal essences. The "ideas," however, are not themselves all of equal excellence; but supreme above the others are the forms of the true, the beautiful, and the good, in which triad again the last takes the highest place, and becomes, perhaps, identical with the Deity, who thus, under the Platonic conception, seems to fluctuate between a personal being and the highest and noblest of the ideas. And as the ideas are the only object of true science, and preparation to commune with them, and especially with the good, the noblest of them all, is the great end of philosophical striving, so in the last analysis science and virtue coincide, and the ideas furnish the basis not only of all science, but of piety and morality.—Physics Plato expounds in a great measure from a Pythagorean standpoint, and his cosmogony in most of its details scarcely rose, probably, even in his own view, above the level of plausible conjecture. The world is originated and not eternal. It is framed by the Creator out of a chaotic and formless mass, after the model of an immovable and perfect archetypal world. The two are brought into union through the medium of a world-soul, placed in the world according to the relation of numbers, and constituting a harmonizing link between the Deity and the archetypal world on the one hand, and blind and formless matter on the other. As the work of a good being, the world must be as perfect as the untractable and essentially evil nature of matter admits. Hence the universe is a unity, and has the most perfect of all forms and motions, the spherical and the circular. The stars are heavenly and imperishable essences, and the earth lies, round, self-poised, and immovable, in the centre of the world. The soul, according to Plato's conception of its nature, would come into the department of physics. It consists, in his view, of two portions, the soul proper, the intellect or reason, divine and immortal, and a sensuous or appetitive principle, material and perishable; while intermediate between them, but approaching nearer to the reason, is a third element which he calls passion, and which thus mediates between the divine and the earthly, the intellectual and the sensuous, as the soul of the world mediates between Deity and matter. The immortality of the soul Plato maintains at length and with great earnestness. He argues it from the general principle that contraries spring from contraries, death from life, and consequently life from death, from the soul's preëxistence and consequent independence of the body, from its simplicity which renders it incapable of dissolution, from its superiority to the body, from its bearing within it the principle of life, &c. The soul's own proper evil, viz., sin, does not annihilate it; much less then can an alien and merely incidental evil, like the dissolution of the body, have any such power. He believes in future retribution, exonerates God from responsibility for sin and suffering, and sets forth in elaborate myths the blessedness of the virtuous and the punishments of the vicious, blending, however, with his teaching the Pythagorean doctrine of metempsychosis.—In ethics Plato holds to the Socratic doctrine that virtue is a science and consequently matter of instruction. Virtue is essentially one, the good, but has various forms of development. He retains the fourfold division of the virtues into wisdom, courage, temperance, and justice. The first three ally themselves to the three divisions of the soul respectively, wisdom being the proper virtue of the intellect, courage of the passionate portion, and temperance of the animal or sensuous. Justice is the principle that pervades and regulates the whole. In discussing the nature of the chief good, which the ancients made the starting point of their ethical system, Plato avoids the opposite extremes of cynicism and hedonism, that on the one hand which excludes pleasure, and that on the other which makes it identical with pleasure. True virtue always carries with it its own enjoyment, and the virtuous man, another name for the philosopher, finds his highest happiness in communion with and assimilation to the good and the divine. Politics with Plato, as with the Greeks generally, are closely allied to ethics. The state is but the individual on a larger scale; the individual but a miniature state. Hence for purposes of moral analysis Plato turns from the individual to the state, as in deciphering an inscription he would turn from smaller and more obscure to larger and more legible characters. His analysis of a state is but an enlargement of his psychological analysis. Its division is threefold. The governing class represent the intellect, the essence of the soul, the laborers and handicraftsmen its sensuous and appetitive portions, and the soldiers or guards the intermediate passionate element. The virtue of the first class is wisdom, of the second temperance, and of the third courage; while in the state, as in the individual, justice is the principle that runs through, regulates, and harmonizes the whole. According to the ordinary Greek conception, Plato makes the state supreme, and merges in it all the interests of individual and domestic life. Household relations and ties are to be unsparingly sacrificed on the altar of the state. A community of wives and of goods is to take the place of domestic life and of private property. The education and the employments of the citizens are all to be regulated by the state. Plato draws out at length his system of education. He would banish all dramatic poetry as involving the personating of fictitious characters, and thus virtually sanctioning falsehood, all music except the simpler and more manly kinds, all those fables which exhibit degrading pictures of the gods, and everything that can foster timidity and the fear of death. The governing class in the state should consist of philosophers—of those who, having risen to the contemplation of the real and the true, can estimate at their worth the shadowy pursuits and pleasures of the multitude. A monarchy is to be preferred on account of the difficulty of finding many men qualified to rule. In the "Laws," however, Plato abandons the monarchical theory for that of a mixed government. His views are decidedly aristocratic, and he would devolve all the privileges of the government on the two higher classes, while the multitude are merely to be kept under wholesome restraint.

Slavery Plato would tolerate, but only the enslaving of barbarians, not that of Greeks by Greeks.—A tendency to a trinity of doctrines runs through the philosophy of Plato. In psychology we have the trinity of reason, passion, and appetite; in ethics, of wisdom, courage, and temperance; in ontology, of being, becoming, and not being; in knowledge, of science, opinion, and sensation; in cosmogony, of God, the soul of the world, and matter; in the state, of magistrates, warriors, and laborers. The list might be prolonged still further. Plato, of all authors, is the one to whom the least justice can be done by any formal analysis. In the spirit which pervades his writings, in their untiring freshness, in their purity, love of truth and of virtue, their perpetual aspiring to the loftiest height of knowledge and of excellence, much more than in their positive doctrines, lies the secret of their charm and of their unfailing power. Plato is often styled an idealist. But this is true of the spirit rather than of the form of his doctrine; for strictly he is an intense realist, and differs from his great pupil, Aristotle, far less in his mere philosophical method than in his lofty moral and religious aspirations, which were perpetually winging his spirit toward the beautiful and the good. His formal errors are abundant; but even in his errors, the truth is often deeper than the error; and when that has been discredited, the language adjusts itself to the deeper truth of which it was rather an inadequate expression than a direct contradiction.—Among the translations of Plato, the most distinguished is the Latin version of Marsilius Ficinus, in which the printed works of Plato were first given to the world (Florence, 1483). A German translation by Schleiermacher, never completed, is admirable, and is accompanied by learned introductions which have been translated into English. The latest and best German translation is by Steinhart and Müller. Plato has been translated into French by Victor Cousin, and there is an Italian version by Dardi Bembo. In English, the translation by Thomas Taylor (5 vols. 4to, 1804) is marred by its author's very imperfect acquaintance with Greek. The earlier and much better version of Floyer Sydenham (1767–'80), of which Taylor's is a continuation, embraced but nine dialogues; and the translation in Bohn's "Classical Library" (6 vols., 1848–'54), by different hands, is very unequal and of no special value. Recently an admirable translation of Plato's entire works has been made by Prof. Jowett, master of Balliol college, Oxford (4 vols. 8vo, 1871), with elaborate analyses and introductions to the several dialogues, leaving almost nothing to be desired for the understanding and application of the original. Among the translations of the separate works may be mentioned that of the "Republic" by Davies and Vaughan, that of the "Philebus" by Edward Poste, and that of the "Gorgias" by E. M. Cope. Editions of the entire or separate works are very abundant. The first edition (Venice, 1513) was arranged in tetralogies, according to the division of Thrasyllus. In that of Henry Stephens (3 vols., 1578) much pains was bestowed on the correction of the text. This was reprinted in the Bipont edition (11 vols., 1781–'6), with the Latin version of Marsilius Ficinus. Immanuel Bekker first brought the text into a satisfactory condition (Berlin, 1816–'18), which text was reprinted by Priestley in a variorum edition (11 vols., London, 1826), the last two volumes containing the Latin version of Ficinus, and was still further corrected by Ast (9 vols., Leipsic, 1819–'27). Since then many able German scholars have devoted time and labor to the editing and elucidation of Plato, among whom may be named Baiter, Orelli, Winckelmann, Hermann, Hirschig, and Stallbaum. Stallbaum's edition, in Jacob and Rost's *Bibliotheca Græca*, with special introductions and full Latin notes, is by far the best annotated working edition of Plato. Among the useful subsidiary works for the study of Plato are Zeller's *Platonische Studien* (1839) and *Sokrates und die Sokratische Schule* (1868); T. H. Martin's *Études sur le Timée* (1841); Van Heusde's *Initia Philosophiæ Platonicæ* (2d ed., 1842); Bonitz's *Platonische Studien* (2 vols., 1858–'60); Whewell's "The Platonic Dialogues for English Readers" (3 vols., 1859–'61); and Grote's "Plato and the other Companions of Socrates" (3 vols. 8vo, 1865).

PLATOFF, Matvei Ivanovitch, count, a Russian general, of Greek origin, born about 1760, died in 1818. He was brought up among the Cossacks of the Don, and after many years' service in the Russian army became their hetman in 1801, and subsequently was made general of cavalry. He acquired great celebrity in 1812, when, after being defeated by the French at Grodno, and having retired into the interior, he returned with 20 regiments of Cossacks, terribly harassing the retreat of the invaders, and capturing many French soldiers and all their Moscow booty. He was equally formidable to the French in some of their subsequent disasters, especially at Leipsic. In 1814, while protecting the passage of the allied army through the valleys of the Marne and Seine, he committed fearful depredations. After the occupation of Paris, he went with Blücher to London to receive a silver sword from the corporation of that city. The Russian government made him a count. He spent the rest of his life in retirement. In 1853 the emperor Nicholas placed a monument over his grave.

PLATON LEVSHIN, a Russian prelate and historian, born near Moscow in July, 1737, died there, Nov. 23, 1812. He was rector of a seminary, and wrote a manual of the dogma of the eastern orthodox church (St. Petersburg, 1765), which has been translated into foreign languages. In 1775 he was made archbishop of Moscow, and in 1787 received the title of metropolitan. He was an eloquent preacher. His works include a history of the Russian church (2 vols., Moscow, 1805; 2d ed., 1823), and 20 volumes of sermons. His biography was written by Snegireff (Moscow, 1831; new ed., 2 vols., 1856).

PLATTE. I. A N. W. county of Missouri, separated from Kansas by the Missouri river, which bounds it S. and S. W., and intersected by the Little Platte river; area, 416 sq. m.; pop. in 1870, 17,352, of whom 1,192 were colored. It has a diversified surface and fertile soil. It is intersected by the Kansas City, St. Joseph, and Council Bluffs railroad, and the southwestern division of the Chicago, Rock Island, and Pacific. The chief productions in 1870 were 196,060 bushels of wheat, 1,470,861 of Indian corn, 152,114 of oats, 62,046 of potatoes, 311,495 lbs. of butter, 24,577 of wool, and 2,802 tons of hay. There were 6,525 horses, 1,476 mules and asses, 4,487 milch cows, 7,442 other cattle, 11,702 sheep, and 35,985 swine; 11 flour mills, 4 distilleries, 12 saw mills, and 2 pork-packing establishments. Capital, Platte City. **II.** An E. central county of Nebraska, bounded S. E. by Platte river, and intersected by Loup fork and Shell creek; area, about 700 sq. m.; pop. in 1870, 1,899. The Union Pacific railroad passes along the S. border. The soil is generally fertile, and the surface undulating and diversified with prairies and woodland along the streams. The chief productions in 1870 were 43,905 bushels of wheat, 65,290 of Indian corn, 40,230 of oats, 18,350 of potatoes, 57,625 lbs. of butter, and 5,879 tons of hay. There were 552 horses, 835 milch cows, 2,237 other cattle, 427 sheep, and 782 swine. Capital, Columbus.

PLATTE RIVER. See NEBRASKA.

PLATTSBURGH, a town and village of Clinton co., New York, capital of the county, situated on Cumberland bay, an inlet of the W. shore of Lake Champlain, at the mouth of the Saranac river, 145 m. N. of Albany and 22 m. S. of the Canada line; pop. of the town in 1870, 8,414; of the village, 5,139. The village is lighted with gas, has a good fire department, and is supplied with water from a reservoir fed by springs, 7 m. distant. The principal public buildings are the custom house and post office, court house and jail, and the high school building recently erected at a cost of $40,000. Plattsburgh is a United States military station, the barracks being situated about a mile S. of the village. It is a station on the New York and Canada railroad, a branch of which extends to Au Sable Forks, 20 m. S. W., bringing the village into easy communication with the Adirondack wilderness. The wonderful Au Sable chasm is 12 m. distant. Plattsburgh is the port of entry of the Champlain customs district. The value of imports into the district for the year ending June 30, 1874, was $2,176,784; of exports therefrom, $1,076,111. The number of entrances from Canada was 1,707, tonnage 136,870; clearances, 1,798, tonnage 145,612; clearances in the coastwise trade, 993, tonnage 68,098; belonging in the district, 849 vessels, with an aggregate tonnage of 58,268, of which 769 of 52,487 tons were canal boats. Large quantities of logs are floated down the Saranac river at high water, and the product of 52 iron bloom forge fires is brought to Plattsburgh for shipment, the ore being obtained from mines on the Saranac and Au Sable and their tributaries. The village contains a foundery, two machine shops, a bloom forge, planing mill, shingle mill, woollen factory, four saw mills (producing annually about 25,000,000 ft. of lumber), and several large carriage and furniture manufactories. It has two national banks, a savings bank, three good hotels, five public school houses besides the high school building, two weekly newspapers, a public library containing 1,000 volumes, and six churches.—Plattsburgh was settled in 1785, principally from Long Island and Dutchess county. One of the first naval battles of the revolution was fought on Lake Champlain off this place, Oct. 11, 1776, Benedict Arnold commanding the American fleet. The Royal Savage, Arnold's supply ship, which was sunk early in the battle, is still visible at low water. During the war of 1812 Plattsburgh was the headquarters of the United States forces on the northern frontier, and Cumberland bay was the scene of an engagement between the American and British flotillas, Sept. 11, 1814. (See CHAMPLAIN, LAKE.) The place has been devastated by two remarkable fires, in 1849 and 1867; each time the main business portion of the village was destroyed.

PLATYPUS. See ORNITHORHYNCHUS.

PLAUEN, a town of Saxony, in the circle of Zwickau, on the White Elster, 60 m. S. by W. of Leipsic; pop. in 1871, 23,355. It is the chief point in Germany for the manufacture of white cotton goods and embroidery. The town is the seat of numerous officials, and contains a gymnasium, a teachers' seminary, and industrial and other schools.

PLAUTUS, Titus Maccius, a Roman dramatist, born at Sarsina in Umbria about 254 B. C., died in 184. The little we know of his life is derived from a passage in Aulus Gellius, quoted from Varro. He went to Rome when young, entered the service of the actors, and having made sufficient money left the city, and set up in business for himself. He failed, and returned to Rome, where he was employed in turning a hand mill. While thus occupied he wrote three comedies, which were successful; and from that time he wrote constantly, and became the favorite comic dramatist. His plays continued to be performed as late as the reign of Diocletian. Cicero considers his wit as equal to that of the old Attic comedy. When Varro wrote there were 130 plays attributed to Plautus, although some were supposed either to have been written by another person of the same name, or to have been old plays rewritten and improved by the poet himself. Varro could enumerate only 21 which were without any question authentic, and these, being the comedies most carefully preserved, are all extant with one exception, the *Vidularia*, which, being last, was probably torn off in the manuscript. The *Captivi* is usually considered the finest work of Plautus. His plots were mostly taken from the Greek writers of the new comedy, although in his treatment of the subject he does not slavishly adhere to his models. The real name of this poet was not known until it was demonstrated in an essay published by Ritschl in 1842 that it was Titus Maccius, and not Marcus Accius, as it had always been printed. The text of Plautus is very corrupt, some of the scenes having been forged at a later period. A palimpsest manuscript was found in the Ambrosian library of Milan, which was as old as the 5th century, and this also contains interpolations. The *editio princeps* was published at Venice in 1472, by Georgius Merula. All the modern editions of Plautus have been superseded by that of F. W. Ritschl (5 vols., Bonn, 1848–'54; 2d ed., 1871). Thornton and Warner translated all the plays into English (5 vols. 8vo, 1767–'74).

PLAYFAIR, John, a Scottish natural philosopher, born at Benvie, Forfarshire, March 10, 1748, died in Edinburgh, July 19, 1819. He was sent at the age of 14 to the university of St. Andrews to be educated for the Scottish church. Here he was occasionally selected by Prof. Wilkie to lecture to his classes on natural history. On the death of his father in 1772 he entered the ministry, and in 1773 he obtained his father's living of Benvie. In 1779 his "Essay on the Arithmetic of Impossible Quantities" was published in the 68th volume of the "Philosophical Transactions." In 1782 he resigned his living to become a private tutor; and in 1785 he became assistant professor of mathematics with Dr. Adam Ferguson in the university of Edinburgh. In 1805 he was appointed general secretary of the Edinburgh royal society, and in the same year became professor of natural philosophy. His literary productions comprise contributions to the "Transactions of the Edinburgh Royal Society" and the "Edinburgh Review," and a number of separate publications, of which a collected edition appeared in 1822 (4 vols. 8vo, Edinburgh). In 1795 appeared his well known edition of Euclid, under the title "Elements of Geometry," prepared for his university classes; in 1802 his "Illustrations of the Huttonian Theory of the Earth," and in 1812–'16 his "Outlines of Natural Philosophy" (2 vols. 8vo), containing the substance of his lectures. In 1815–'16 he made an extensive geological tour in France, Switzerland, and Italy, to procure materials for an enlarged edition of the "Illustrations," which he did not live to complete. His last important work was a "Dissertation on the Progress of Mathematical and Physical Science," prepared for the "Supplement to the Encyclopædia Britannica," and left by him incomplete.

PLAYFAIR, Lyon, an English chemist, born in Meerut, British India, in 1819. He was educated at St. Andrews, Scotland, studied chemistry under Thomas Graham in Glasgow and London, and in Giessen under Liebig, and became professor of that science in the royal institution at Manchester. He was consulted by Prince Albert on matters of art and science, drew up sanitary reports for the government, was appointed by Sir Robert Peel chemist to the museum of practical geology, and took a prominent part in the exhibition of 1851. He was joint secretary of the department of science and art from 1853 to 1856, when he was made inspector general of government museums and schools of science. In 1857 he was elected president of the London chemical society, and in 1858 professor of chemistry in the university of Edinburgh. He resigned his chair in 1868, and has since represented the universities of Edinburgh and St. Andrews in parliament in the liberal interest. In November, 1873, he became a member of Gladstone's administration as postmaster general, and retired with it in February, 1874.

PLEADING. The pleadings in a cause are the alternate allegations, by plaintiff and defendant, of those matters of fact which constitute on the one hand the ground of action, and on the other the ground of defence. The science of pleading in general consists of the principles of those rules and formulas according to which, for the sake of method and certainty, these allegations are uniformly expressed. Special pleading is the invention of the English common law; it is particularly designed to develop the precise point in controversy, and to present it in a shape fit for decision. Other systems allow the parties to make their statements independently of each other and at large, and then require the court, or sometimes the litigants themselves, to select from the undigested mass, as precisely as may be possible, the matter of dispute. But it is the distinctive feature of the English method that it compels the parties themselves so to guard and narrow their respective statements, that the particular question for decision, and nothing else, shall be developed in the first instance. The very essential effect of this pleading is to clear away the undisputed or immaterial matter which conceals the issue. The system of English pleading, as it existed before its recent overthrow, was one of great antiquity. Like the *brevia* or writs, that is, the formulas which were essential to the institution of different kinds of suits, pleading originated probably among the Normans, and was introduced by them into England at the time of the conquest. To go still further back, it may perhaps be safely asserted that the *brevia* and pleading of the English law had a remoter origin in the Roman jurisprudence; but it has been well suggested that the strict and subtle technicalities of the English pleading, which most resembles the earlier Roman forms, were not borrowed from them, but were rather the fruit of the school logic of the middle ages. It is to the period of the later and more liberal Roman law, if to any, that we owe the suggestion of any of our forms of pleading. —The pleadings were once oral altercations in open court in the presence of judges. This was certainly the mode of pleading in the time of Henry III., in the earlier part of the 13th century; and it is supposed to have continued until a much later period. These oral pleas were made either by the suitor himself or by his pleader, who was called *narrator* or *advocatus*. It was the office of the presiding judges to direct the allegations of the parties so as to develop an issue, that is, a specific matter, which one party affirmed and the other denied. While these pleadings were going on, an officer of the court made minutes of the declarations of the parties, and added to them memoranda of the issue and of the acts of the court and the parties during the progress of the cause. These official notes formed the record, and were completed by the addition of all the material incidents in the case until it was finally disposed of. That part of the record which preceded the issue comprised the pleadings alone, and these, it has been seen, were for a long time oral. Gradually the practice changed. At first probably the allegations, though made alternately as before, were now entered on the record in the first instance, and by the pleaders themselves. This seems to have been the mode in the latter part of the 15th century. It was no doubt for the purpose of avoiding the inconveniences of this method that the modern plan was devised of putting the pleadings in separate papers, and either mutually exchanging them or filing them in the proper office of the court, when at a subsequent stage of the proceedings they were all together copied into the court records. It would be a long labor, if indeed it were possible, to follow out the historical development of English pleading. It is enough to say that it had become a most elaborate and intricate science, and was so for a century or more. The system, which had been designed to reduce to the utmost simplicity and certainty the controversies of suitors, had become so overgrown and embarrassed with refinements and technicalities as to be very often rather a hindrance than a help in the prosecution of causes. The abuses of pleading grew in great part out of the undue prominence which had been permitted to its incidental and purely formal parts. —The single design of special pleading was, by eliminating all else, to reach the distinct point in controversy for the purpose of submitting it to a court or jury. In the outset of the case, therefore, the plaintiff set forth simply the facts which gave him, as he claimed, a good cause of action. This declaration, like every other good pleading, contained, or rather implied, a complete logical proposition. Its major premise was the general principle or rule of law, within which the minor premise, that is, the particular facts, were supposed by the plaintiff to be included, and the conclusion or legal inference was that judgment which he sought from the court or jury. But as it is one of the fundamental principles of the theory of pleading that legal propositions are never to be recited, but are presumed always to be in the mind of the court, the major premise and the conclusion are suppressed, and the declaration is reduced to the statement of the mere facts. Now comes the defendant, who in his answer or plea may, in the first place, traverse or deny the plaintiff's facts. If he does so, he also proposes a trial of the point thus affirmed on the one side and denied on the other. If the plaintiff accepts the tender (and he must do so if it be well made), the parties are at issue and the pleadings are at an end. But the defendant may be willing to admit the facts, but may conceive that they are not included in the proposition of law on which the plaintiff in fact rests, or that they are stated in a form which violates some of the rules of pleading. In neither case has he any facts to adduce, and therefore instead of pleading he demurs; that is to say, as the derivation of the word imports, he waits to see whether in the opinion of the court he must answer. This demurrer may be general, suggesting that the declaration is insufficient in point of law, or it may be special, assigning particularly that it is and how it is inartificial and so defective in form. Again, the defendant may neither traverse nor demur, but may admit or confess, as the phrase is, the plaintiff's facts, and allege new facts in avoidance of them. In the first pair then, so to speak, of substantial pleadings, the defendant must either demur, or plead by way of traverse, or by way of confession and avoidance. In the first two cases an issue, in one instance of law and in the other of fact, is necessarily produced. In the last, the pleadings must still go on until one of these issues is reached, the subsequent pleas being alternately by plaintiff and defendant—replication, rejoinder, surrejoinder, rebutter, and surrebutter. Further than the last the pleadings rarely extend; for as no case can involve an inexhaustible store of new and relevant facts, there must soon be an end of pleas in confession and avoidance, and an issue of fact or of law will then be easily developed. These various forms of pleas, traverses, demurrers, tender and joinder of issue, and the various forms of general and special issues, form the essential parts of pleading. But besides these there belonged to the science certain accidental parts, such as dilatory pleas and pleas in abatement, by which a party excepted to the jurisdiction of the court, to the competency of the plaintiff, or to the writ or declaration; imparlances of several kinds, profert and oyer, counterpleas, new assignments, and numerous others incident to the various phases of suits, all of them contrived to render the procedure more exact and certain, and all of them essential in greater or less degree to the system. Some of these rules, as well substantial as accidental, concerned mere matters of form. The violation of these rules was good ground of demurrer. For example, of the multiform rules which governed the production of the issue, of those particularly which demanded its unity, certainty, directness, and materiality, many were purely formal. Defects in these respects were taken advantage of by special demurrers. These pleas did not regard at all the merits of the case; they did not deny that the party whose pleading was objected to had a good ground of action or of defence; but simply raised the question whether the statement or denial of facts was made in that particular technical way which the rules of pleading required. Even though the cause of action was confessedly good, yet if the statement was inartificial (and in England the question whether it were could be carried through all the courts, and even to the house of lords), the party must submit to loss of his suit or pay often heavy costs to the other side for the privilege of amending. The art of pleading possessed, then, two distinct systems of rules, the substantial and the formal. So far as only the former were looked at, the science was justly pronounced ingenious and excellent. But the formalities and technicalities devised and insisted on, though they were for the sake of securing greater nicety, had become so numerous; so many fictions had been engrafted on the system for the same purpose; so completely, by the gradual accretion of all sorts of refinements and the want of judicious legislative interposition in removing them, had the substantial rules of pleading been overbalanced and often defeated by those which were only formal; by all these means, so many technically fair but really unfair advantages were offered to dishonest and quibbling pleaders, that at last the complaints against the whole science of special pleading became so loud, that nothing but its almost entire abolition could quiet them. Partial and important reforms were effected in the reign of William IV., especially by the so-called new rules of Hilary term, 1834. But that which they sought to do, and partially did, was more effectually accomplished by the common law procedure act of 1852. By that act the old terms of art and technical forms of pleas were all cleared away, and the whole theory and intent of the mode of procedure under the act were directed to the framing of simple narratives of facts by plaintiffs, and plain and fair answers to them by defendants. This is carried still further by the act for the constitution of a supreme court, passed Aug. 5, 1873. Under that act forms of action are to be no longer recognized; suit is commenced by writ of summons indorsed with a statement of the nature of the claim made or of the relief or remedy required; the defendant files and serves a printed statement of his defence, set-off, or counterclaim, if any, and the plaintiff files and serves his reply where one is required. All these are to be "as brief as the nature of the case will admit." The plaintiff may join any number of clauses of action in the same suit, but to avoid confusion and embarrassment in trial, the separate claims may be ordered to be separately tried.—In our older states the science of special pleading had been received as part and parcel of the common law; but many of its more odious features either were never adopted, or have been reformed by legislative enactments. The most remarkable reform thus made in this country was perhaps that effected in New York in 1848. In that year the separate equity jurisdiction which had hitherto existed there was suppressed. The code adopted for the regulation of legal processes expressly declared that in future there should be no distinction between legal and equitable remedies; the common law practice and pleading were put out of the way, and gave place to the present system, which in its general features very closely resembles the equity procedure. One form of action only is allowed. The pleadings are few, concise, and must be framed in language easily understood. Allegations are to be liberally, not strictly, construed. Facts are to be respected rather than pleadings; and the latter may at any time in the progress of the suit be revised and accommodated to the proofs. In all respects the code seeks, by the utmost liberality, to assure easy and efficient remedies to suitors. Changes have been made in a like spirit, and in the same direction, in the other states; and to no part of the whole province of jurisprudence has reform addressed itself in this country more earnestly and more acceptably than to the reconstruction of the forms of process, and to the restoration of its essential efficiency and simplicity to the necessary science of pleading.

PLEASANTS, a N. W. county of West Virginia, separated from Ohio by the Ohio river; area, about 280 sq. m.; pop. in 1870, 3,012, of whom 16 were colored. It has a broken or rolling surface, and contains some good farming land. The chief productions in 1870 were 15,283 bushels of wheat, 67,580 of Indian corn, 14,596 of oats, 15,925 of potatoes, and 592 tons of hay. There were 620 horses, 1,863 cattle, 2,918 sheep, and 1,954 swine. Capital, St. Mary's.

PLEBEIANS (Lat. *plebeius*, from *plebs*, the common people), a class of Roman citizens not included either among the patricians or clients. Originally they were excluded from the senate, from all offices of state, from the making of laws, and from marriage with patricians. The constitution of Servius Tullius recognized their political existence, and divided them into tribes. Tarquinius Superbus abolished all the privileges conferred on them by the preceding king; and although on his expulsion these were professedly restored, yet when all fears of his return had been laid aside their condition was exceedingly grievous. The first important step toward their full consideration in the commonwealth was the establishment of the tribuneship in 494 B. C., a privilege which was still further increased by a law of Volero Publilius in 471 that the election of these magistrates should take place in the *comitia tributa*, in which the power of the plebeians was predominant. After the overthrow of the decemvirs, another point was gained by the *lex Valeria Horatia* in 449, which declared that the *plebiscita*, or decrees of the *comitia tributa*, should be of equal authority with the decrees of the *comitia centuriata*, and should become laws if sanctiomed by the senate and confirmed by the *curiæ*. A change in the constitution was again made in 445, by the law of the tribune Caius Canuleius, which legalized the marriage of the two classes; but the demand of his colleagues that the consulship should be thrown open to plebeians was so strenuously resisted by the patricians, that a compromise was finally agreed upon, in accordance with which was established the new magistracy of military tribunes with consular power, to which members of both orders were declared eligible. Yet this was but a barren victory, so far as regarded its immediate effects, as the tribunes were usually chosen from the patricians. But the great point was finally gained in 366 by the passing of the Licinian laws, one of which abolished the office of military tribune, and declared that one of the consuls should always be a plebeian. The rogation to that effect was proposed in 376 by C. Licinius Stolo and Lucius Sextius, and the reading of it was then stopped by the eight other tribunes, who had been gained over by the other party. Year after year these two men were elected to the tribuneship in the face of the fiercest opposition of the great patrician houses; and after ten years of struggle their rogations became laws. Afterward the dictatorship, censorship, prætorship, and finally by the *lex Ogulnia* in 300 the priesthood, were thrown open to plebeians. The *lex Valeria* was extended by the law of the plebeian dictator, Q. Publilius Philo, passed in 339, providing that the *plebiscita* should not require the confirmation of the *curiæ* in order to have the force of laws; and it was still further extended by the *lex Hortensia* in 286, declaring that they should not need the sanction of the senate. Henceforth the distinction between the two orders gradually disappeared.

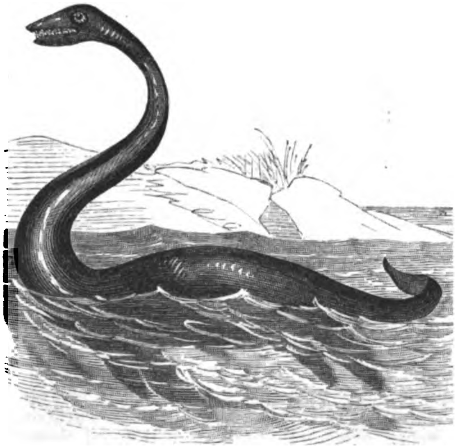
PLEBISCITUM (Lat., decree of the plebs; Fr. *plébiscite*), the designation in the early days of the Roman republic of laws enacted by the plebeians without the intervention of the patricians and the senate. The first plebiscitum in modern times occurred in France in 1793, upon the proposed constitution, the masses of the people being called upon to give simply affirmative or negative votes. The most memorable later ones are the popular votes taken on the consulate for life in 1802, and the first and second empires in 1804 and 1852.

PLEIADES, a group of stars situated on the shoulder of the constellation Taurus. It was regarded by Mädler as the central group of the system of the milky way. Alcyone, the brightest of the Pleiades, a star of the third magnitude, was considered to occupy the apparent position of the central point round which our universe of fixed stars is revolving. This theory, however, had no other basis than the general community of direction observed among the proper motions of the stars in Taurus; and as it is now known that in other regions of the heavens a similar phenomenon can be recognized, it is impossible to accept Mädler's theory. Apart from this, it has been pointed out by Sir John Herschel that the Pleiades are too far from the milky way to be a probable centre of motion for the stars of our galaxy.

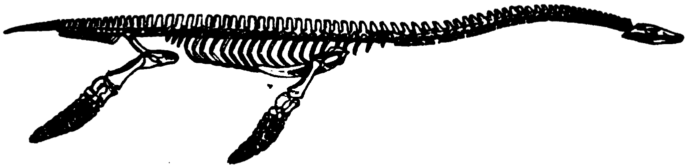
PLEIOCENE. See PLIOCENE.

PLEODONT. See LIZARD.

PLESIOSAURUS, an extinct gigantic enaliosaurian or marine reptile, found principally in the lias (secondary) formation of England, in company with the still larger ichthyosaurus. The head was small, supported on a long, flexible, snake-like neck, the body and tail short, with four limbs in the shape of powerful swimming paddles, like those of turtles or cetaceans; the skin was probably naked. This singular genus, named by Conybeare, to a lizard's head united the teeth of a crocodile, a neck like a serpent's body, the trunk and tail of a quadruped, the vertebræ of a fish, the ribs of a chameleon, and the fins of a whale. The apertures through which the air was respired are just in front of the orbits on the highest part of the head, and not at the end of the snout as in crocodiles; the paddles were probably invested with a sheath of integument, and from the natural curvature of the bones must have had a more elegant and tapering form and greater flexibility than in cetaceans. Nearly 20 species are described, of which the best known is the *P. do-*



Plesiosaurus dolichodeirus (restored).



Skeleton of Plesiosaurus.

lichodeirus (Conyb.), which attained a length of 10 to 12 ft.; there were about 50 teeth in each jaw; the neck was as long as the body and tail together, having 33 vertebræ, 10 more than the longest neck of a bird; the ribs were united in front by several cartilages, enabling the animal to inflate the lungs readily and fully, and take in a supply of air for a prolonged immersion; the coracoid bones were very large, producing an elongation of the sternum, and indicating that the animal was aquatic, and able only with difficulty to drag itself along on land. The less strong and less numerous teeth show a less carnivorous disposition than in the ichthyosaurus; the slighter general conformation was suited rather for tranquil waters than to encounter powerful waves. Species are found also in the oölite and cretaceous strata, though less abundantly than in the lias, in which their numerous remains and coprolites show that the waters must have swarmed with them. For full details on the species, see Owen's "Report on British Fossil Reptiles," in "Reports of the British Association" for 1839.—The genus *pliosaurus* (Owen) includes the gigantic reptiles of the Oxford and Kimmeridge clays of England, intermediate between the plesiosaurus and the ichthyosaurus; the teeth and the bones of the limbs and trunk were like those of the former, the first being stouter and more trenchant; but they had the short neck, massive head, and cetacean-like form of the latter genus. It is interesting to note that pliosaurus did not appear until after both the genera which it in part resembles; no fragment of their bones, according to Pictet, has been found in the lias or oölite, and none until the time of the Oxford clays. The best known species is the *P. brachydeirus* (Owen), for an account of which see Owen's report in "Reports of the British Association" for 1841.

PLESKOV. See Pskov.

PLESSIS, Joseph Octave, a Canadian bishop, born in Montreal, March 3, 1762, died in Quebec, Dec. 4, 1825. He was ordained priest in Quebec March 11, 1786, and became secretary to the bishop and rector of the cathedral. Elected coadjutor to Bishop Denaud Sept. 6, 1797, the captivity and death of Pius VI. prevented the ratification of his choice at Rome till April 28, 1800, when he was confirmed with the title of bishop of Canata. His election by the church of Canada and his confirmation by the pope gave rise to a long controversy with the British government. The kings of France had exercised the right of presentation to all bishoprics, as well as that of confirming the election of bishops when made by the local clergy. The same right was claimed by the English crown after the conquest of Canada; but the claim was strenuously and successfully resisted by Bishop Plessis. He was consecrated in Quebec, Jan. 25, 1801, and became titular bishop Jan. 17, 1806. In 1818 he was appointed by the crown a member of the legislative council of Canada. After becoming titular bishop he raised the standard of learning in the existing colleges, founded at his own expense the college of Nicolet, and multiplied primary schools. He also displayed great zeal in providing for the spiritual wants of the Indians, and made several fruitless attempts to obtain the recall of the Jesuits and other missionaries. In 1819 he visited London and Rome for the purpose of having British North America organized into an ecclesiastical province, with an archbishop at Quebec and suffragan bishops in the principal cities and missionary centres; but he only succeeded in having auxiliary bishops appointed for Montreal, Halifax, and the Indian missions of the Red River district. He left several pastoral letters, a collection of Latin synodal addresses, and a manuscript journal of his journey to Europe.—See J. B. A. Ferland's "Life of Bishop Plessis."

PLESSIS-MARLY, Seigneur du. See Mornay.

PLETHO. See Gemistus.

PLEURA (Gr. πλευρά, the side), the thin serous membrane which lines the cavity of the chest on either side, and is reflected at the root of the lung over the external surface of these organs. That portion of the pleura which lines the wall of the chest is called the costal pleura, and that which covers the lung the pulmonary pleura. The space between the two is the pleural cavity. In the healthy condition, however, this cavity can hardly be said to exist, since the two opposite surfaces of the pleura, though not adherent, are in contact with each other, or separated only by an extremely thin layer of serous fluid, which enables them to glide readily over each other in the movements of respiration. (See Lungs, and Thorax.) In disease the pleural cavity on either side is liable to be distended by an exudation of serum or of pus, or sometimes of air which gains access from a wound of the lung or of the walls of the thorax. The pleural surfaces may also become adherent to each other, as a consequence of inflammation, thus obliterating more or less completely the pleural cavity, and interfering with the free action of the lung.

PLEURISY (*pleuritis*), inflammation of the pleura, the membrane which lines the chest, and also covers the lungs. Pleurisy has been recognized and described as a distinct disease from the earliest times, but practically, before the discoveries of Laennec, it was impossible in many cases to distinguish it from pneumonia. The disease, though rare in old age and in early infancy, is confined to no period of life. Prolonged exposure to cold, external violence, and the existence of tubercles in the lungs may be considered its most frequent causes, though in many instances we are unable to trace it to any particular source. The disease may be either acute or chronic. Acute pleurisy ordinarily begins with a chill, which is soon followed by a sharp pain limited to a single spot, and most commonly seated just below the breast on one side. This pain is often very intense, preventing the patient from taking a full breath, and increased by motion, by pressure, and by cough. It lasts a variable length of time, but gradually subsides as effusion takes place. In not a few instances pain is altogether absent. Cough comes on early, is short and commonly dry, and adds greatly to the distress of the patient. The respiration early in the disease is short and difficult; as the pain subsides the patient breathes more easily; but when effusion to any amount has taken place, any exertion rarely fails to render the breathing abnormally frequent. Before effusion takes place the patient commonly lies on the back or the sound side, rarely on the affected side; after it the patient generally lies on the back or on the affected side. Fever is commonly present, the skin is hot and dry, the pulse frequent and sometimes hard, the urine scanty and high-colored. In the first stage of acute pleurisy the respiratory murmur is feeble, and the breathing, as before observed, is short and jerking; very early in the disease friction sounds, either slight and grazing or rubbing, may be heard; these depend on the exudation of plastic lymph. During this period the percussion sound remains almost or entirely unaffected. Sometimes the disease stops short at this point. Where effusion takes place, the most depending part of the chest on the affected side gradually becomes dull on percussion; as this dulness increases the respiratory murmur is lost on auscultation, or is replaced by a distant bronchial breathing; the friction sound is lost over the part occupied by the fluid, though it may sometimes still be heard above it. The vibratory thrill that is felt by the hand applied to the walls of the chest when a patient speaks is abolished over the seat of the effusion. When the effusion is moderate in amount, the height to which it rises posteriorly can very readily be marked out by percussion, and this will be found to vary with the varying position of the patient. At this time, and commonly near the inferior angle of the scapula, a peculiar modification of the voice, ægophony (Gr. *αἰξ*, a goat, and *φωνή*, voice), can be heard by the ear or stethoscope applied to the walls of the chest while the patient is speaking. It consists of a variety of bronchophony in which the voice acquires a tremulous, cracked character, which has been compared to the bleating of a goat. When the effusion is very great it distends the pleural sac, the lung deprived of air being compressed against the spinal column. The diaphragm is now pushed downward, the intercostal spaces are bulged out, the side is larger by measurement than the opposite one, and is comparatively motionless in respiration. The heart is displaced, and when the effusion is on the left side can sometimes be felt beating to the right of the right nipple. In cases of recovery, as the fluid is absorbed the respiratory murmur and the normal percussion note gradually return from above downward; for a long time, however, and sometimes permanently, owing to the thickness of the false membranes formed from the plastic lymph effused, the respiratory murmur is feeble and the percussion sound dull at the lower part of the side. In some cases the side is restored to its natural form; in others it becomes retracted, the shoulder being drawn down, the ribs approximated, the spine curved, and the whole side rendered smaller and sunken.—When acute pleurisy occurs in a strong and healthy young adult, general bloodletting may be required; but in a majority of cases local bloodletting by means of cups and leeches is all that is necessary, and this has a remarkable influence over the pleuritic pain. After bloodletting diuretics may be administered, and of these the best are the acetate and bitartrate of potassa, digitalis, and squill. Where the disease is obstinate it may be advisable to give mercury, but it should be given in small doses and stopped immediately upon the slightest signs of ptyalism. When the acute symptoms have subsided, the application of a succession of blisters to the affected side has a decided influence in promoting the absorption of the effusion; or instead of blisters, resort may be had to bromide and iodide of potassium, or a course of sulphur. The diet should be low, and the patient where the effusion is extensive or increasing should abstain as much as possible from fluids. Perforation of the thorax has been recommended, and it would appear from numerous trials that, performed carefully, the operation is attended with little risk; but in acute pleurisy it should only be resorted to in those rare cases in which the amount or rapid increase of the effusion threatens the patient with immediate suffocation. In such cases care should be taken by the use of a proper instrument to prevent the admission of air into the thorax.—In chronic pleurisy the effusion remains for a long time stationary, and either gives rise to an acute febrile excitement or to one of a hectic character. It may be the result of an acute pleurisy, it may come on in patients debilitated by previous disease, or it may be complicated with the tubercular diathesis, the last being the case in the majority of instances. The effused fluid may be either serum mixed with flocculent lymph or pus. When the strength of the patient is good, a gentle mercurial course with diuretics and the use of flying blisters or ioduretted liniments will often remove the effusion. Bromide and iodide of potassium are often all that is necessary. If the patient be broken down, tonics and cod-liver oil with iodine may be advisable, while ioduretted liniments are freely employed. In young persons, particularly in children, if there be no tubercular complication, the operation for empyema is generally successful.—In some persons pleurisy gives rise to extensive effusion without causing any symptoms to attract the attention of the patient. Sometimes a person may be seen with one pleural cavity distended with fluid, and yet pursuing his ordinary occupations, scarcely conscious that he is ill. This is latent pleurisy, the treatment of which is the same as for acute, except that it should be less active.

PLEURISY ROOT. See Milkweed.

PLEURO-PNEUMONIA. See Murrain, vol. xii., p. 59.

PLEYEL. I. Ignaz, a German composer, born at Ruppelsthal, near Vienna, in 1757, died in Paris, Nov. 14, 1831. He was a pupil of Haydn, visited Italy, and in 1789 was appointed chapelmaster in the cathedral of Strasburg, but lost this post during the revolution. A few years later, having removed to Paris, he became a publisher of music, and afterward established a pianoforte manufactory. He wrote trios, quartets, and sonatas for the piano, which had remarkable success. **II. Joseph Étienne Camille,** a composer, son of the preceding, born in Strasburg in 1792, died in Paris, May 4, 1855. He succeeded his father in the direction of the piano manufactory, and invented several improvements in the construction of pianos. The pianist Kalkbrenner was his partner. He was an excellent pianist, and composed numerous quartets, trios, and sonatas. **III. Marie Félicité,** a pianist, wife of the preceding, born in Paris in 1811, died near Brussels, March 30, 1875. She was of Belgian origin, sister of Prof. Moke of Ghent, and was separated from her husband a few years after their marriage. She completed her studies under Kalkbrenner, became one of the most accomplished performers of her day, and in 1848 was appointed professor at the conservatory of music in Brussels. She reappeared in concert only once, in 1874.

PLICA POLONICA (Lat. *plicare*, to knit together), a disease of the hair and hairy scalp, endemic in Poland, and characterized by a matting together of the hairs. It was formerly common in Poland, but is now rare and almost exclusively confined to wretched and filthy persons. The preliminary symptoms are fever, loss of appetite, headache, vertigo, and pains in the scalp. Then a glutinous secretion makes its appearance upon the hairy scalp, and afterward upon the hairs themselves, which become adherent to each other, and at the same time acquire a morbid sensibility, so that the least touch or movement of them causes acute pain. They become arranged in three different modes: 1, in long flexible locks or strings of agglutinated and pendent hairs; 2 (the most common and characteristic form), in an inextricably tangled mass, consisting of hairs matted together in every direction, and often exhaling a fetid odor and overrun with vermin; 3, in a long mass of disproportioned growth like a horse tail, called *plica caudata* (Fr. *plique à queue*). The malady lasts thus for several months or years. In the majority of cases it gradually subsides after a time, and healthy hair begins to take the place of the diseased growth. It is then sufficient to cut off the tangled mass and allow the new crop of hair to occupy its place; but this measure is not effectual unless the disease already shows signs of having exhausted itself. During its height the best treatment is attention to cleanliness and the prevention of any further irritation to the scalp. A microscopic fungoid vegetable growth, the *tricophyton tonsurans*, was discovered by Günsburg in 1843 in the diseased hairs of plica polonica, and the malady was attributed by the discoverer to the presence of the vegetable parasite. But it is still doubtful whether it occurs in all cases, and whether it may not be the accompaniment rather than the cause of the malady. Experiments have been tried in the inoculation of plica polonica, with varying and indecisive results.

PLINY. I. The Elder (Caius Plinius Secundus), a Roman author, born A. D. 23, died in 79. Verona and Novum Comum (the modern Como) both claimed to be his birthplace. He belonged to a noble and wealthy family, and when about 23 years old served in Germany under L. Pomponius Secundus, whose life he afterward wrote, and was made commander of a troop of cavalry. At this time he composed a treatise *De Jaculatione Equestri*, and began a history of the Germanic wars, which was finished in 20 books. Returning to Rome in 52, he studied jurisprudence, and practised as a pleader. He wrote a treatise in three books on the education of an orator, entitled *Studiosus*, and during the reign of Nero composed a grammatical work, *Dubius Sermo*, in eight books. Appointed procurator of Spain, he held that office until a little before 73, when he returned to Rome, became an intimate friend of Vespasian, and continued the history of Aufidius Bassus, in 31 books, down to his own time. An account of his death is given in a letter of the younger Pliny to Tacitus (*Epist.* vi. 16). He was at Misenum in command of the fleet when, on Aug. 24, 79, his attention was directed to a cloud of very unusual size and shape, which was afterward discovered to proceed from Vesuvius, and was the precursor of the great eruption which destroyed Herculaneum and Pompeii. He immediately went to an eminence near at hand to obtain a closer view, and desiring to make a fuller examination, he ordered a light vessel to be got ready, and provided himself with tablets to take down his observations. At the solicitation of the mariners of Retina (now Resina), he went to their assistance, and commanded the ships to be launched to save the inhabitants of other cities upon that coast. Proceeding to the very point of danger, he dictated observations upon the phenomena and attendant terrors of the scene. So close did he come to the mountain that a storm of pumice stone, pieces of burning rock, and hot cinders, which kept constantly falling thicker, rained upon the ships, while the sudden retreat of the sea left them in danger of falling aground. The steersman advised him to return; but Pliny ordered him to carry him to Pomponianus, who was at Stabiæ, whence he was about to set sail in the greatest consternation. Pliny, to quiet his apprehensions, ordered a bath, and partook of his supper with apparent unconcern. He then retired to rest and slept soundly; but the court of the house was filling so fast with cinders, that he was aroused and joined his friends, who, tying pillows upon their heads to protect themselves from the storm of stones and cinders, fled to the fields. It was now day, but the profound darkness was relieved only by the light of the torches. They found the sea too tempestuous to embark, and Pliny lay down upon the sand. A strong smell of sulphur compelled the friends to retire; but no sooner had Pliny's slaves raised him from his recumbent position than he fell dead from suffocation. Three days afterward his body was found, bearing no marks of violence.—Pliny was one of the most industrious of writers, and was noted for the economical use of his time. He collected an enormous mass of information, and while he was procurator of Spain he was offered for his materials 400,000 sesterces by Largius Licinius. He bequeathed to his nephew 160 volumes of *Electorum Commentarii*. The only work of his extant is the *Historia Naturalis*, in 37 books, which embraces astronomy, meteorology, geography, mineralogy, zoölogy, botany, and medicine, besides treating of painting and statuary. The number of authors quoted in this work is between 400 and 500, and the number of volumes about 2,000. There have been many editions of it, the first of which was published at Venice in 1469. Among the others are those of Hardouin (5 vols. 4to, Paris, 1685), Lemaire (10 vols. 8vo, Paris, 1827–'33), Panckoucke (20 vols., Paris, 1829–'33), Sillig (5 vols. 12mo, Leipsic, 1831–'6), Detleffen (Berlin, 1866 *et seq.*), and H. Kiel (Leipsic, 1870). An English translation was published by Philemon Holland (London, 1601), and there is another by Dr. Bostock and H. T. Riley in Bohn's "Classical Library" (6 vols., London, 1855). **II. The Younger** (Caius Plinius Cæcilius Secundus), a Roman author, nephew of the preceding, born probably in Comum in A. D. 61 or 62, died about 116. He studied rhetoric at Rome under Nicetis Sacerdos and Quintilian. At the age of 14 he composed a Greek tragedy. In his 19th year he spoke frequently in the forum, and afterward was employed to plead causes before the court of the centumviri and the senate. After serving in Syria as a military tribune, he was made quæstor Cæsaris, prætor about 93, consul in 100, and in 103 proprætor of the province of Pontica, where he remained nearly two years. He was also curator of the channel and banks of the Tiber, and attained the rank of senator. His only extant works are the *Panegyricus*, written upon his appointment to the consulship, and noted for its fulsome praise of Trajan, and his *Epistolæ* in ten books. The first nine books of the latter are addressed to various individuals, but the tenth, which is the most important, contains the correspondence between Pliny and Trajan, including the celebrated letter in regard to the early Christians, in which he characterizes their religion as a "perverse and extravagant superstition," and the reply of the emperor, which shows him to have been the more tolerant man of the two. The first edition of the *Epistolæ* is that of Venice (4to, 1471), where also appeared the first of the *Panegyricus* and *Epistolæ* together (8vo, 1485). Among the best editions of both works are those of J. M. Gesner, revised by G. H. Schäfer (Leipsic, 1805), which contains a life of Pliny by Cellarius, and of Gierig (2 vols. 8vo, Leipsic, 1806). The edition of the *Epistolæ* by Cortius and Longolius (4to, Amsterdam, 1734) is said to be the best. A life of Pliny, more elaborate than that of Cellarius, was written by Masson (8vo, Amsterdam, 1709). There have been two English translations of the *Epistolæ*, one by Melmoth (1746), the other by Lord Orrery (1759). "Pliny's Letters," by the Rev. A. Church and the Rev. W. G. Brodripp, was published in Blackwood's "Ancient Classics" (Edinburgh and London, 1875).

PLIOCENE, in geology, the upper of the three epochs of the tertiary or mammalian age. The term was introduced by Sir Charles Lyell, and is derived from the Greek *πλείων*, more, and *καινός*, recent, because more than half of the fossils found in it belong to existing species. The quaternary age, or age of man, is next above it. The pliocene epoch is divided into older and newer pliocene, the latter called also by Lyell pleistocene (Gr. *πλεῖστος*, most), because nearly all the fossils in it belong to existing species. The pliocene formation has been more carefully studied in England than anywhere else, particularly the lower pliocene in Suffolk, which is the only place where it occurs on the island. It there covers the upper beds of the London clay, and its upper and lower divisions have received the local names of red crag and the coralline crag, each about 50 ft. thick. The red crag consists of beds of quartzose sand and gravel with a mixture of shells, the whole deposit being strongly ochreous. The fossils are chiefly mollusca, but there are also bones and teeth of large sharks, skates, and other fish, and the ear bones of one or more true whales. The coralline crag is calcareous and marly, consisting of mollusks, echinoderms, and other marine animals, separated in places by thin layers of hard limestone and coral-like masses. It is easily distinguished from red crag by its whiteness; it was formed at a greater depth, and in an ocean having a higher temperature. Pliocene deposits have been found near Antwerp and on the banks of the Scheldt, from which over 200 species of shells have been taken, more than half of which are recent species found in the northern seas, and a few still living in the Mediterranean. Similar deposits occur in Normandy, and in Italy between the Apennines and the sea, on either side; and the marine strata of the seven hills of Rome are of the same age. In the United States pliocene beds occur in North and South Carolina, extending as far south as the Edisto river. In them have been found the remains of a mastodon and a stag, and they contain from 40 to 60 per cent. of living species of shells. The beds are soft, either clay, loam, or sand, and lie in depressions of the older tertiary and cretaceous formations. The equivalents of these beds in Virginia and New Jersey are not clearly made out. In the upper Missouri region, the great cemetery of the pliocene, the White river group is overlaid by other fresh-water tertiary beds 300 to 400 ft. thick, called by Meek and Hayden the Loup river group. They contain in their upper part the remains of numerous extinct mammals, including camels, rhinoceroses as large as the Indian species, elephants, five species of the horse family, a wolf larger than any living species, a tiger as large as the Bengal tiger, and a porcupine, besides land and fresh-water shells, which are probably of recent species. These beds occur on the Loup fork of the Platte, and stretch north to the Niobrara and south beyond the Platte.

PLOCK, or **Plotzk.** **I.** A government of Russia, in Poland, bordering on Lomza, Warsaw, from which it is separated by the Vistula, and Prussia; area, 4,198 sq. m.; pop. in 1872, 490,291. The surface is level, and agriculture is the principal occupation of the inhabitants. **II.** A town, capital of the government, on the right bank of the Vistula, 58 m. N. W. of Warsaw; pop. in 1867, 21,843. It is the seat of a bishop, and one of the oldest towns of Poland, and in former times was the residence of the dukes of Masovia. It consists of an old and a new town, and has several squares. Besides the cathedral, with tombs of Polish dukes, there are ten other Catholic churches. Among the schools is a Piarist gymnasium. The trade is active, especially in grain and lumber.

PLOCKHURST, Bernhard, a German painter, born in Brunswick in 1825. He completed his studies under Couture in Paris. From 1865 to 1869 he was professor of painting in Weimar, and subsequently in Berlin. Among his works are "Mary and John returning from the Sepulchre," "The Adulteress before Christ," "Mater Dolorosa," and "The Resurrection."

PLOMBIÈRES, a watering place of France, in the department of Vosges, 15 m. S. of Épinal, in a fine valley of the Angronne, a tributary of the Saône, about 1,300 ft. above the level of the sea; pop. about 1,500. It has noted thermal, ferruginous, and other springs, chiefly used for bathing, and recommended for diseases of the liver and digestive organs, rheumatism, and many other ailments. The bath houses belong to the government, and the principal of them were established by Napoleon III. It contains fine promenades, a handsome new church, a former royal palace, now inhabited by physicians, and a hospital. Hardware is made here. Napoleon III. and Cavour met here in 1858.

PLOTINUS, a Neo-Platonic philosopher, born in Lycopolis, Egypt, about A. D. 204, died at Puteoli about 270. At the age of 28 he went to Alexandria, and attended the lectures of Ammonius Saccas, the founder of the eclectic school, with whom he remained 11 years. In 242 he accompanied the emperor Gordian's expedition against the Persians, in order to study the philosophy of the East; and on the death of the monarch (244) he barely escaped with his life to Antioch. He then went to Rome, and taught the doctrines of Ammonius, but only orally, as he had agreed to keep them secret; and although his fellow pupils, Herennius and Origen, began to publish them, he did not follow their example until the first year of the reign of Gallienus (254). Ten years later, when Porphyry became his pupil, he had written 21 books, and subsequently composed 33 more. In Rome, where he remained until his death, he was a great favorite not only with men of science, but with senators and statesmen; and so great was the confidence reposed in him, that many Romans on their deathbeds made him the guardian of their children and estates. Gallienus was so much attached to him, that had it not been for the efforts of some of the courtiers he would have rebuilt two cities in Campania to afford Plotinus an opportunity of founding a commonwealth modelled after the ideal republic of Plato. Plotinus never corrected nor read through a second time his manuscript, and paid no attention to spelling or the division of syllables. His handwriting was execrable, and as his thoughts were put down without any systematic connection, he is one of the most obscure writers to be found in any language. His productions, revised by his pupil Porphyry, are in 54 books, called the Enneads, and treat of the most abstract subjects of thought, such as "Entity and Unity," "The Essence of the Soul," and "The Unity of the Good." According to his biographer, Porphyry, so ashamed was he that he existed in the body, that he would neither reveal his parentage, his ancestry, his native country, nor the day of his birth. So great was his contempt for the body, that he had no concern for his health, and was very scanty in the use of food, generally refraining from meat altogether. In spite of their obscurity, his writings have exercised some influence upon modern philosophy, having been diligently studied by Cudworth, Henry More, Norris, Gale, and others. There is a striking resemblance between the doctrines of Plotinus and the pantheistic ideas of Spinoza, evinced in the treatise of the former written to show that all being is one and the same. His life by Porphyry is the only authority upon his history. The Enneads were first translated into Latin by Marsilius Ficinus (Florence, 1492). In 1835 the entire Greek text was first published by Creuzer (3 vols. 4to, Oxford). The "Select Works of Plotinus" have been translated into English by Thomas Taylor (London, 1834); and a French version of the Enneads by M. Bouillet was completed in 1861 (3 vols. 8vo, Paris).

PLOUGH, an instrument for breaking up, turning over, mixing, or loosening the soil, drawn by animal or steam power. The plough of the ancient Egyptians was of wood, a single crooked stick serving for the tail, which, extending below the place where the horizontal beam was secured to it, formed the point or share. This was stiffened by a rope which passed up from it to the beam, and the handle was divided so as to present a hold for each hand of the ploughman. (See fig. 1.) Wilkinson thinks it probable that the point was shod with a metal sock, either of bronze or iron. In the Old Testament metallic ploughshares are alluded to more than seven centuries B. C.: "They shall beat their swords into ploughshares." (Isa. ii. 4; Micah iv. 3.) In the time of Hesiod two sorts of ploughs were in use among the Greeks. One was formed of a limb of a tree having two opposite branches diverging like the arms of an anchor from its shank.

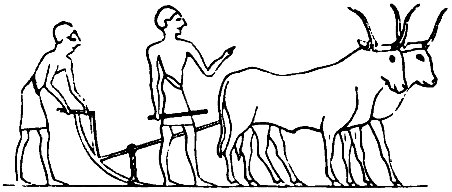


Fig. 1.

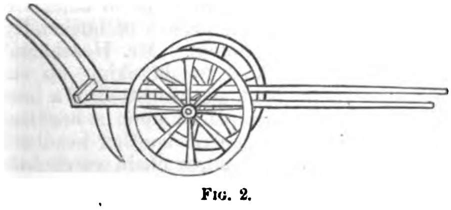


Fig. 2.

The main stem served as the beam or pole by which the plough was drawn; one arm, sometimes shod with iron or bronze, entered the ground, and by the other the implement was pressed into the ground and guided. The other kind was constructed of three sticks secured together by nails; one was the beam, which at its lower end was joined to the nearly horizontal share, and from this proceeded the tail or handle. Figs. 2 and 3 are wheel ploughs from Caylus's collection of Greek antiquities, showing forms used in the 3d century B. C. Fig. 4 shows a Greek plough used in Sicily before Syracuse was taken by Marcellus, 212 B. C. Fig. 5 shows a modern Assyrian plough. Fig. 6 is the modern plough of Castile, and fig. 7 that which is now used in Sicily. Among the aborigines of North and South America the plough appears to have been almost entirely unknown. The Peruvians, who were the most skilled in agriculture, employed, as described by Prescott, a rude substitute constructed of a strong, sharp-pointed stake, traversed by a horizontal piece 10 or 12 in. from the point, on which the ploughman might set his foot and force it into the ground. Six or eight strong men were attached by ropes to the stake and dragged it forcibly along, accompanied by women, who followed to break up the sods with their rakes.—The modern plough originated in the Netherlands, whence England obtained most of her knowledge of field and kitchen gardening. In the early part of the 18th century many ploughs were imported from Holland. The mouldboards and shares of these ploughs were made of wrought iron or steel, but about 1784 James Small of Berwickshire, Scotland, who wrote a treatise

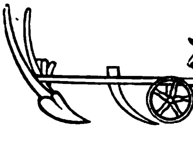


Fig. 3.

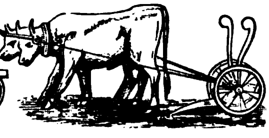


Fig. 4.

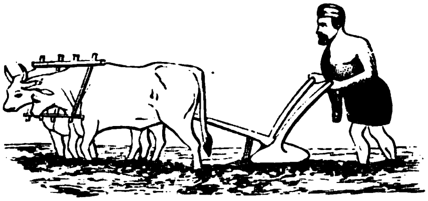


Fig. 5.

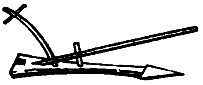


Fig. 6.

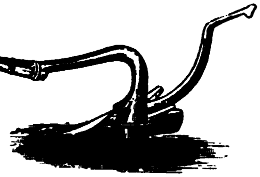


Fig. 7.

on ploughs, made cast-iron mouldboards and wrought-iron shares; and in 1785 he made cast-iron shares. The American plough during the colonial period was of wood covered with sheet iron, the share being wrought. In 1797 a cast-iron plough was patented by Charles Newbold of New Jersey. Thomas Jefferson about the same time investigated the subject, and formed a theory of the proper shape of the mouldboard, which he treated as consisting of a lifting and an upsetting wedge, with an easy connecting curve. Daniel Peacock, in 1804 or 1807, patented a plough having the mouldboard and landside of cast iron and separate, while the share was of wrought iron edged with steel. Jethro Wood of Scipio, N. Y., patented improvements in 1819, and for a long time was known for making the best ploughs in market.—In the most approved ploughs now in use, of the breaking-up class, the mouldboard is made of plate steel, its external surface concave and corresponding in its curve to the segment of a cylinder, of which, however, it would comprise but a small portion. The breaking-up ploughs are the most important of the several sorts of this implement. The depth to which they penetrate is regulated, as in other ploughs, by the contrivance at the end of the beam called the clevis, to which the draught chain is attached. This is a sort of rack or elongated iron staple, into which the chain is hooked, high up for deep ploughing, and lower down if the ploughing is to be shallow. The greatest depth reached by those of the largest size is about 18 in., and the width of the furrow about 24 in. As a breaking-up plough is run through soil of some tenacity, as prairie or grass lands, the furrow is regularly laid flat over to one side; and as the plough comes round again another adjoining slice is laid against the former one; and so the work goes on till the whole field is covered with the long overturned slices of earth and sod laid flat or slightly lapped at different angles on each other, as the nature of the soil may require; in stiff clayey soils an angle of about 45° is best. A wheel is often placed at the end of the beam, which runs upon the surface of the soil, and from which the beam may be raised or lowered. A wheel sward plough of good construction is represented in fig. 8. Sidehill ploughs are breaking-up ploughs with the mouldboard so arranged that, after running through the furrow along the side of a hill, it may be instantly shifted round and secured on the other side of the beam. By this contrivance the plough may pass directly back and turn the next furrow down the slope of the hill against the one which preceded it. Most of the modified forms of mouldboards, ploughshares, &c., are introduced with the special object of reducing the friction to a minimum and thereby lessening the amount of horse power. The beams and handles of ploughs are, for the sake of lightness, generally preferred of wood, though some are still made in the manner much in vogue a few years ago, especially in England, entirely of iron. Gang ploughs, constructed by placing from two to four or even more ploughs on a common frame, one diagonally behind another so that the furrows are made to overlap each other, are often used upon prairie or level land, drawn by several yoke of oxen or spans of horses, or by steam power. By reducing the size of the plough bodies and increasing their number, the implement becomes the cultivator, which is made to cut at once a number of parallel shallow furrows. For merely stirring and loosening the soil to produce the effect of hoeing, ploughs of great simplicity are in use, which are not very different from some of the ploughs of the ancient Greeks and Egyptians. One class of these, known as bull-tongue ploughs, are largely used in the southern cotton and corn fields. The share is pod-shaped, and is driven through the ground with the convex surface forward. Subsoil ploughs are used to run in the furrow behind the turn-over plough to break up the subsoil to any desired depth, but without turning it up. They have a beam and handles like an ordinary plough, but no mouldboard or share, having in place of them a strong flat standard of sufficient height, armed with a point. They are not required in very porous soils.—The first steam plough, or plough moved by steam power, which was practically or successfully worked in the field, was patented by Mr. Heathcote, M. P., of England, in 1832. A patent had been obtained by Major Pratt in 1810, whose plan employed two steam engines, one on each headland, drawing a plough between them by means of an endless rope. It also embraced the modern plan in steam ploughs of having two sets of them placed back to back, one being elevated and out of the ground when going in one direction, and *vice versa.* In 1769 also a specification for a patent was made by Francis Moore for a machine or engine to plough, or do any other branch of husbandry, without the aid of horses. Mr. Heathcote's machine was intended for breaking up and draining swampy land, and consisted of a locomotive steam engine placed upon a headland and opposite a carriage on another headland, by which means an endless chain carried the plough backward and forward. In 1836 this plough, it is said, was worked with tolerable success at Red Moss in Lancashire; but at a trial near Dumfries in 1837 its performance did not warrant the judges in awarding the prize of £500 which had been offered for a

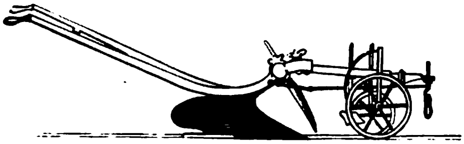


Fig. 8.

successful steam plough. The apparatus was cumbersome and expensive; the engine was of 25-horse power, and the work required the employment of ten men and boys. After this improvements were made upon the plan of Major Pratt by Alexander McRae and also by Mr. Tulloch in 1846, and again by Mr. McRae in 1849. In 1854 Mr. John Fowler exhibited a patent steam draining apparatus, in which a balance gang plough, the construction of which is shown in fig. 9, was moved back and forth by means of an endless rope attached to a steam engine placed at one headland, and passed around a drum at another. At the Newcastle show of the royal agricultural society in 1864, Mr. Fowler introduced two engines, each of seven-horse power, working upon opposite headlands, in which the performance was satisfactory. Howard's system of steam ploughing employs a rope whose line of draught may be changed by fixed pulleys at the corners of the field, so that the position of the engine need not be changed so often. Considerable numbers of both these ploughs are made in England and sent to the East and West Indies and to Egypt, and there are said to be more than 1,000 steam ploughs now in use in England. Recently locomotive engines called traction engines have been brought into use as a motive power for ploughs in England, and some of them have been imported into the United States. Messrs. Aveling and Porter of Rochester, England, have devised a traction engine for ploughing, which has been used upon the estate of A. T. Stewart at Garden City, Long Island. The English gang, however, which consisted of four ploughs, each intended to turn a furrow 12 in. wide, was not found adapted to the work required of it at that place, and a new one designed by Mr. W. R. Hinsdale was substituted, and is now in use, which turns three furrows, each 14 in. wide, in a very satisfactory manner. The principal features of the new gang are the reduction of the supporting wheels from four to two, one at either side and end, and placing the points of the shares on a line connecting them. By this means inequalities in the surface of the soil produce less interference, and a more uniform depth of furrow is secured. The raising of the ploughs so as to clear the ground during transportation and turning at the headlands is effected by the levers *h* and *l*, fig. 11. The ploughman upon the seat *k*, by pulling the lever *h* forward, brings the clamp *i* upon the rim of the wheel *b*, and elevates the rear end of the frame to which the lower end of the lever is attached. The point of attachment is the axle of the wheel *g*. This being turned makes traction upon the wire rope *f*, which is fastened to its periphery, passing over the pulley *p*. This traction causes the lever *l* to raise the standard (supplied with a double joint) of the wheel *a* from an inclined to a vertical position, thereby elevating the forward end of the frame simultaneously and to a corresponding height with the rear end. The beam of the plough is moved to the right or left by means of a rack and pinion at *d*, controlled by the wheel *c* in the hands of the ploughman. The mouldboards of these ploughs were designed by Mr. S. A. Knox of Worcester, Mass., and are remarkable for their easy draught. The engine with the plough in position, and an enlarged view of the plough, are shown in figs. 10 and 11. The engine has only one steam cylinder, which might be thought insufficient where so great a constant strain is required as in hauling a plough; but the momentum of the rapidly rotating fly wheel supplies sufficient power at the dead points, the piston with a pressure of 120 lbs. per square inch being capable of making 150 strokes per minute. The engine is also used to haul trains of wagons, to drive threshing machines, mills, pumps, and saws, and as a general motive power.

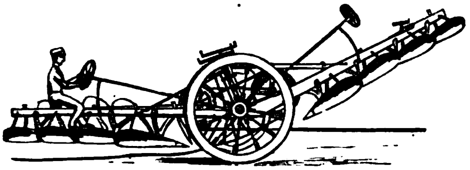


FIG. 9.

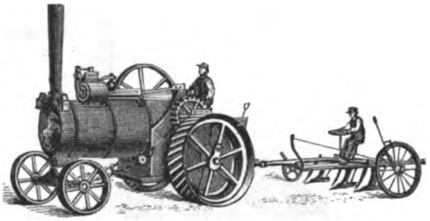


FIG. 10.

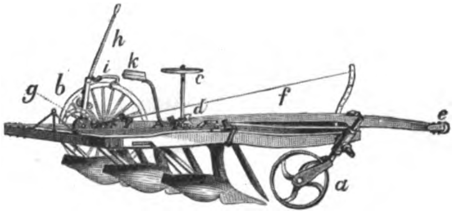
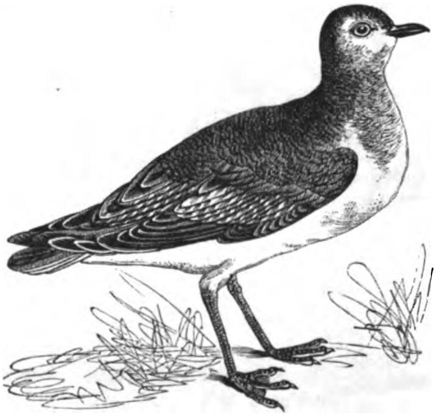


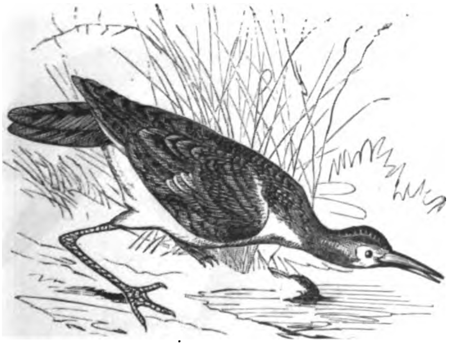
FIG. 11.

PLOVER (Fr. *pluvier*, rainy), the common name of the *charadrinæ*, a large group of wading birds, very generally distributed over the world; so called because their flocks migrate during the rainy season in autumn. They have a moderately long and slender bill, with culmen depressed at the base but vaulted at the tip, much as in the pigeons; sides compressed, and in the groove are placed the nostrils; wings long and pointed; tail moderate, broad, and generally even; tarsi usually long and rather slender; the outer and middle toes more or less united at the base, the hind toe wanting or very small; claws compressed and curved; the head is very large, the neck short and thick, and the folded wings reach beyond the tail. The genus *vanellus* (Linn.) has been described under LAPWING.—In the genus *charadrius* (Linn.) the bill is shorter than the head, strong and straight; the first quill the longest; hind toe wanting. The prevailing color is yellowish gray, spotted; the tail transversely banded; no collar on the neck; tarsi and lower thighs uniformly reticulated; legs bluish green. They are usually seen in small flocks near the sea, in the summer often going inland; the food consists of small insects, mollusks, worms, and berries, and is usually sought in the evening or at night; they are strong and rapid fliers, though for short distances, and fast runners; the note is a plaintive whistle easily imitated. The nest is a slight hollow in the sand, lined with dried grass, and the eggs, commonly four, are placed with the small ends together; the young leave the nest as soon as hatched; if disturbed on or near the nest, the parent birds use various devices to lead the intruder from it, pretending lameness or inability to fly. The golden plover (*C. Virginicus*, Borck.) is about 10½ in. in length and 22½ in alar extent; in the male the upper parts are brownish black, with numerous spots of golden yellow, on the upper tail coverts generally assuming the form of transverse bands; entire under parts in the breeding season black with a brownish bronzed lustre; bill black. After the autumnal moult the black of the under parts gives place to light grayish with darker spots and streaks. It is found all over North America, and in South America, northern Asia, and Europe; it is called bullhead and field plover; it breeds in the north, going south in winter. It very much resembles the European golden plover (*C. pluvialis*, Linn.), except that the axillaries in the latter are white instead of ashy; the eggs are said to be delicious, as also are the young and old birds. The dotterel of Europe (*C. morinellus*, Linn.), very common, is blackish ash with a white band behind the eyes and another above the breast; breast and flanks reddish brown, and end of tail white. Boie separated from *charadrius* the genus *ægialitis*, comprising several smaller species, with lighter and uniform unspotted plumage, with neck and head generally banded with dark, and without continuous black on the abdomen. The five following plovers belong to this genus of Boie. The killdeer (*C. vociferus*, Linn.) has been noticed under that title. Wilson's plover (*C. Wilsonius*, Ord) is about 7½ in. long and 14½ in alar extent; bill 1 in., robust; entire under plumage, forehead, and stripe over eye, white; band of black above the white one on forehead; wide transverse band on breast brownish black; upper parts light ashy brown; a ring of white around the back of neck; bill black and legs yellow. In the female there is not the black on the forehead, and the pectoral band is reddish and ashy brown. It is found on the Atlantic coast of the middle and southern states and in Brazil; it is a constant resident in the south, and breeds there, sometimes going as far north as Long Island; the breeding season commences about June 1; the eggs are 1¼ by 1 in., dull cream-colored, with a few pale purple dots and dark brown spots; it is very plump in autumn, and is excellent for the table; it feeds both by night and day. The ring plover (*C. semipalmatus*, Bonap.) is a little smaller than the last, light ashy brown above, tinged with olive; under parts, front, throat, and ring around the neck, white; a black band across the breast, extending around the back of the neck below the white ring; bill orange, black-tipped, and legs yellow; female similar, but lighter; young without the black frontal band, and the pectoral band ashy brown. It is found throughout temperate North America, and is common on the Atlantic coast; it breeds in the north, in Labrador about June 1, in rocky mossy districts in the interior; the nest is a cavity in the moss, sheltered from the north winds and exposed to the sun, near the pools formed by the melting snow; it goes south about the middle of August; the flesh of the young bird is juicy and tender; it associates with other birds of similar habits, and is not at all shy. The piping plover (*C. melodus*, Ord) is about as large as the last, but of a much lighter brown, almost ashy, the feathers with a whitish edging; there is no black band from the bill through and under the eye; the white collar around neck and the black frontal and pectoral bands less, the latter usually not meeting in front; rump and upper tail coverts almost white; tail white at base, tipped with black. It is found throughout eastern North America, as far as Nebraska occasionally, and in the southern states; it breeds all along the sandy coasts from Labrador to Florida; it rarely goes far inland, and



Golden Plover (Charadrius Virginicus).

does not frequent rocky or muddy places. It is a very rapid flier and runner, and is so nearly the color of the sand on which it squats close when alarmed that it is hard to detect. The notes are very soft and mellow, approaching those of a song bird, whence its name. It is seldom pursued by sportsmen, on account of its small size, though its flesh is very delicate and savory. The European ring plover (*C. hiaticula*, Linn.) so nearly resembles the *C. semipalmatus* of America as to be with difficulty distinguished from it. There are about 40 other species of the genus *charadrius*.—In the genus *squatarola* (Cuv.) the bill is nearly as long as the head, strong and straight; tail long, broad, and rounded; hind toe very small, not touching the ground. Two species are described, found in both hemispheres, migrating from the temperate to arctic and antarctic regions, where they pass the warmer months; they frequent river margins and marshes as well as the seashore, running with rapidity and uttering at the same time a shrill piping whistle; the food consists of worms, slugs, and various insects; the nest is a slight hollow in the ground lined with dry grass. The black-bellied plover (*S. Helvetica*, Cuv.) is the largest of the American birds of this group, having a length of about 12 in. Most of the lower parts, the front of the neck, and around the base of the bill to the eyes, are black; above white, nearly pure on the forehead, barred with brownish black on the back and tail, and tinged with ashy on the sides; abdomen, under tail coverts, and tibiæ white; quills brownish black; bill and legs black. In winter the plumage is dark brown above, spotted with white and yellow, and white below, with dark brown lines and spots on the breast. It is widely distributed over America, and along the seacoasts of most parts of the world; it migrates chiefly by night, resting and feeding by day; it is very shy except in the breeding season, which is the same as to time as in the other species.—The bird called the upland or field plover is Bartram's sandpiper, belonging to the subfamily *totaninæ*, and is the *actiturus Bartramius* (Bonap.), or *tringa Bartramia* (Wils.). It is 12 in. long; the bill is longer than the head, curved at the tip, the cleft extending nearly to the eyes; the upper mandible is grooved for three fourths of its length, and the feathers extend on it further than on the lower; wings and legs long; tarsus longer than middle toe; outer toe most webbed; tail more than half the wing, graduated. The general color is brownish black above with a greenish lustre, the feathers edged with ashy white and yellow; lateral tail coverts yellowish white, with black arrowheads; wide stripe over eye and under parts pale yellowish white, nearly pure white on abdomen, with brownish black lines on the neck; legs light yellow. This is the most terrestrial of the family, frequenting as its name imports the upland dry places, sometimes in the neighborhood of and at others far removed from the sea. It is spread over eastern North America, South America, and Europe, very abundant in the interior of the Atlantic states, preferring plains and cultivated fields; it is one of the few species which have not decreased with extended civilization. It passes the winter in the vast prairies of the southwest, going in spring and summer as far north even as the Saskatchewan, returning in the autumn; it is seen in large and small flocks, and sometimes in pairs; it is very wary, a swift flier, and a rapid runner; the notes are plaintive and mellow; the food consists of beetles, grasshoppers, crickets, seeds, and berries; it is fat and juicy in the autumn, and excellent eating; the habits are the same as in the true plovers, which, though ranked among waders, rarely enter the water except on the very edge of the sea and ponds.



Upland Plover (Actiturus Bartramius).

PLOWDEN, Edmund, an English lawyer, born about 1517, died in 1584. He studied at Cambridge and Oxford, and in 1552 was admitted to the practice of physic and surgery. He then studied the common law, according to Wood; but Plowden in the preface to his "Commentaries" says that he began the study of the law in the 20th year of his age. He was made sergeant at law under Queen Mary, and in 1557 and 1560 he was reader or lecturer of the Middle Temple. He wrote "Commentaries or Reports of Divers Cases in the Reigns of Edward VI., Mary, and Elizabeth" (London, 1571, 1578, 1599, 1613, and 1684), written in Norman French, and "Queries, or a Moot Book of Cases, translated, methodized, and enlarged" (8vo, 1662). An English translation of the "Commentaries" appeared in 1761, and was reprinted in 1816 (2 vols. 8vo). His works are regarded as the most accurate and authoritative of the old reports.

PLUM, the name of wild and cultivated species and varieties of trees of the genus *prunus*, and their fruit. Formerly our cultivated stone fruits were distributed in three or four different genera, but the highest botanical authorities now bring the almond, peach, apricot, plum, and cherry all under the genus *prunus* in the tribe *pruneæ*, of the order *rosaceæ* or rose family. The genus consists of trees or shrubs with simple, toothed leaves; calyx with a bell-shaped tube and a five-lobed limb; petals five, spreading; stamens numerous, on the throat of the calyx; ovary one, free, with two ovules; fruit a fleshy drupe with a hard stone, with one seed (rarely two). This description applies to all the stone fruits. The group of species recognized as plums have white flowers, a smooth fruit, generally with a whitish bloom upon its surface, and a flat or flattish stone; some of our native species are, so far as botanical characters go, very close to cherries. Of the half dozen native plums, only three are generally known. The beach plum, *P. maritima*, is found along the coast from Maine to the gulf of Mexico, and is everywhere a low straggling shrub from 2 to 5 ft. high, with stout branches; it is found growing in clumps in the blowing sands of the shore, and often extends inland some 20 m. The oval or ovate leaves are thickish, serrate, smooth above and downy underneath; the fruit is globular, from half an inch to an inch in diameter, crimson or purple, with a distinct bloom; stone very turgid, acute at one edge and rounded and minutely grooved upon the other. This is a variable species, forms of which have received different names; at a distance from the sea the leaves are thinner and smoother and the fruit smaller; the fruit is ripe in September, and usually pleasant to the taste, but sometimes astringent; it is collected in considerable quantities for making preserves, and is sometimes to be found in the markets of seaboard cities. The wild yellow or red plum, *P. Americana*, also called the Canada plum, grows from Canada to Texas, and in some localities is very common. It is a showy tree 8 to 20 ft. high, with a round head; its ovate leaves are conspicuously pointed, thin, very veiny, coarsely or doubly serrate and smooth when old; the fruit is globular or somewhat oval, one half to two thirds of an inch in diameter, yellow, orange, or red, and with scarcely any bloom; the turgid stone somewhat acute on both edges; the pulp juicy and pleasant, but the skin very tough and acerb. The tree is sometimes seen in cultivation, when the fruit is larger and the stone flatter with broader margins. The seeds of this species are used by nurserymen to raise stocks upon which to graft the finer kinds of cultivated plums. The Chickasaw plum, *P. Chicasa*, is probably indigenous only in the southwestern states, but has become naturalized in various localities at the east and north; it is said to have been introduced into the southern Atlantic states by the Indians, and it has been more or less cultivated since the country was first settled. The tree is from 6 to 12 ft. high, less thorny than the preceding, and has long and narrow acute leaves with very fine serratures; the globular fruit is one half to two thirds of an inch in diameter, red, and almost without bloom; the stone is ovoid, nearly as thick as wide, without any margin, but having both edges rounded and one of them minutely grooved; the skin of the fruit is thin and the flavor pleasant. This species is variable in both the wild and cultivated state; owing to the difficulty of cultivating the varieties of the European plum, on account of the attacks of the curculio, much attention has been given of late years to the improved varieties of the Chickasaw, and several named sorts are offered by nurserymen; among these the wild goose, said to have been raised from a stone found in the crop of a wild goose, is the most prominent, and there are others for which great superiority is claimed.—The European plum has its origin surrounded by the same obscurity that attends other cultivated fruits; it has been attributed to *prunus domestica*, but probably this and the bullace plum (*P. insititia*) are forms produced by long cultivation from the sloe or blackthorn (*P. spinosa*), a common tree or shrub in the old world, and sparingly introduced here. It is a much-branched, and in its wild state very thorny shrub, bearing small, globular, black, and astringent fruit. The finer kinds of garden plums are found to vary greatly from each other in the size of foliage, earlier or later blossoming, size and shape of the fruits, and in the smoothness or downiness as well as vigor of their young shoots. A large number of choice sorts have originated in the United States, and while many are larger and more showy, none are superior to the green gage, the best of all plums. Those known as the Lombard, red gage, golden drop, &c., with all the damsons, bear fruit well in sandy soils; while the Smith's Orleans, Washington, Duane's purple, &c., seem suited to a northern climate; and the imperial gage, Coe's golden drop, and Huling's superb are better suited to

Green Gage Plum.

a southern. The plum will grow well in almost any soil, but with some exceptions heavy loams and earths abounding in clay seem best. Muck from salt-water marshes and from docks has been found very serviceable. Common salt promotes the health and luxuriance of the tree.—The plum is liable to a singular disease, known as the black wart, which, seizing upon the young branches, ends by destroying them. Its origin has been attributed to insects, which it sometimes harbors, but it is due to a small fungus, *sphæria morbosa*. The only remedy is to cut and burn the affected branches. The plum weevil is the *rhynchænus nenuphar*, a small dark brown beetle, about one fifth of an inch long, best known as the curculio. The female deposits her eggs in young plums, peaches, and other fruit, making a crescent-shaped incision in the skin; hence the insect is often called the "little Turk." The egg produces a grub which, feeding on the fruit, causes it to fall; the grub enters the earth, and in three weeks appears as a perfect beetle; the insect winters in the perfect state. So destructive is it that large trees will have every plum killed, and in many localities the culture has been abandoned. The best preventive discovered is shaking the trees daily for a few weeks and catching the beetles in outspread sheets, when they must be killed. The fallen plums should be also carefully gathered and destroyed.—The uses of the plum are for dessert, for preserving, and for drying to make prunes. In France several distinct sorts are raised expressly to manufacture into prunes, the most prominent among which are the quetsche (known here as German prune), St. Catharine, Brignoles, and others. The fruits are not gathered until the sun has dried off the dews; they are then picked by hand and spread in shallow baskets, which are kept in a cool and dry place; when they have become soft, they are shut up close in spent ovens and left for 24 hours; they are then taken out and replaced after the ovens have been slightly reheated. On the next day they are taken out and turned by slightly shaking the sieves on which they have been laid. The ovens are heated again, and they are put in a third time; and after remaining 24 hours they are taken out and left to get quite cold. After some manipulation they are submitted to oven heat twice more, and then packed into boxes or jars for sale. The finer kinds of prunes only receive this treatment; for the common sorts the fruit is shaken from the trees, dried with less care, and roughly packed in casks. A kind of dried plum is prepared at Brignoles in France, and bears the name of the place; it has the skin removed before drying, and the stone afterward. From the bruised pulp of plums and the kernels ferment with honey and flour, and the mass distilled, a spirit is obtained in the south of France.

Quetsche Plum, or German Prune.

PLUMAS, a N. E. county of California, containing the sources of Feather river; area, 2,736 sq. m.; pop. in 1870, 4,489, of whom 911 were Chinese. Lying within the Sierra Nevada range, the surface is composed of high mountains, deep cañons, and grass-covered valleys. Many of the valleys are large and fertile, but the chief resources are mineral. According to the census of 1870, 80 gold mines were in operation, of which 5 were quartz and 75 placer. The chief productions were 15,212 bushels of wheat, 63,474 of oats, 16,345 of barley, 14,848 of potatoes, 13,023 lbs. of wool, 234,725 of butter, and 15,765 tons of hay. There were 1,440 horses, 3,465 milch cows, 8,144 other cattle, 12,042 sheep, and 1,342 swine; 3 saw mills, and 4 quartz mills. Capital, Quincy.

PLUMBAGO. See GRAPHITE.

PLUMER, William, an American politician, born in Newbury, Mass., June 25, 1759, died in Epping, N. H., Dec. 22, 1850. He was admitted to the bar in Epping in 1787, was successful as a lawyer, and for many years took an active part in politics. He was eight times elected a representative in the state legislature, of which he was speaker for two years, and was a member and for two years president of the state senate. In 1792 he was one of the delegates to the convention for revising the state constitution. In 1802 he was elected United States senator, and in 1812, 1816, 1817, and 1818 was chosen governor of New Hampshire. In 1820 he was a presidential elector. He contributed to the periodical press, and left many manuscripts. His life has been written by his son, William Plumer, jr., and edited by the Rev. A. P. Peabody (8vo, Boston, 1856).

PLUMER, William Swan, an American clergyman, born in Griersburg (now Darlington), Beaver co., Pa., July 25, 1802. He graduated at Washington college, Virginia, in 1825, studied theology at Princeton, N. J., was licensed to preach in 1826, and in 1827 organized the Presbyterian church in Danville, Va. He soon removed to Warrenton, N. C., where also he organized a church, and afterward preached in Raleigh, Washington, and New Berne, N. C., and in Prince Edward and Charlotte counties, Va. In 1834 he became pastor in Richmond, and in 1847 in Baltimore. In 1837 he founded the "Watchman of the South," a weekly religious paper, which he conducted for eight years. In 1854 he became professor of didactic and pastoral theology in the western theological seminary at Allegheny City, Pa. In 1862 he removed to Philadelphia. In 1865 he became pastor of a Presbyterian church in Pottsville, Pa., and in 1866 professor of didactic and polemic theology in the theological seminary at Columbia, S. C., in which office he still continues (1875). In 1838 he received the degree of D. D. from Princeton, Washington, and Lafayette colleges, and in 1857 the degree of LL. D. from the university of Mississippi. His publications include "The Grace of Christ" (12mo, 1853); "Rome against the Bible" (18mo, 1854); "The Church and her Enemies" (18mo, 1856); "The Law of God" (12mo, 1864); "Vital Godliness" (12mo, 1865); "Jehovah Jireh" (12mo, 1866); "Studies in the Book of Psalms" (8vo, 1867); "The Rock of our Salvation" (12mo, 1867); "Words of Truth and Love" (18mo, 1868); "Commentary on the Epistle to the Romans" (8vo, 1870); "Commentary on the Epistle to the Hebrews" (8vo, 1872); and "Hints and Helps in Pastoral Theology" (12mo, 1873).

PLUMPTRE, Edward Hayes, an English clergyman, born Aug. 6, 1821. He was educated at University college, Oxford, and became fellow of Brasenose in 1844. He was appointed chaplain of King's college, London, in 1847, professor of pastoral theology in 1853, prebendary of St. Paul's in 1863, and professor of New Testament exegesis in 1864. He was preacher at Lincoln's Inn for several years, elect preacher at Oxford in 1851-'3 and 1864-'6, and Boyle lecturer in 1866. In 1869 he became rector of Pluckley, Kent. He is one of the company of revisers of the authorized version of the Bible (1875). His principal publications are: "Sermons at King's College" (1859); "Lazarus, and other Poems" (1864); "Master and Scholar, with other Poems" (1866); "Christ and Christendom," Boyle lectures (1867); "The Tragedies of Sophocles," in verse (2d ed., (1867); "The Tragedies of Æschylus," in verse (1868); and "Biblical Studies" (1870).

PLUNKET, William Conyngham, baron, an Irish lawyer, born in Enniskillen in July, 1764, died Jan. 4, 1854. He was the son of a Presbyterian minister, graduated at Trinity college, Dublin, obtained a scholarship, entered Lincoln's Inn in 1784, was called to the Irish bar in 1787, and became king's counsel in 1798. When the rebellion broke out he gave professional aid to the patriots, and was publicly accused of being an associate in their proceedings. In the Irish parliament, to which he was elected in 1798, he opposed the legislative union with England in 1800, and his speeches in the debates on that measure raised him to the first rank of his party and greatly increased his practice at the bar. In 1803 he was made solicitor general for Ireland, and on the outbreak of Emmet's rebellion was one of the crown lawyers for the prosecution. In 1805-'7 he was attorney general for Ireland. From 1807 to 1822, with a brief interval, he was in the British house of commons, and made several able speeches in favor of Catholic emancipation. He was again made attorney general for Ireland in 1822, and one of his first official acts was to prosecute a large number of Orangemen for riot. In 1827 he was made chief justice of the common pleas in Ireland, and was ennobled. From 1830 to 1841 he was, with an interval of five months in 1834-'5, lord chancellor of Ireland. He passed the rest of his life in retirement at his seat in Wicklow co. An edition of his speeches, by J. C. Hoey, was published in 1856, and his "Life, Letters, and Speeches," edited by one of his sons, with a preface by Lord Brougham, in 1867 (2 vols. 8vo).

PLUTARCH, a Greek biographer, born in Chæronea in Bœotia. The little that is known of his life has been collected chiefly from his own works. He was studying philosophy under Ammonius at Delphi when Nero went to Greece in A. D. 66. He visited several parts of Italy, and resided for some time at Rome, where he lectured during the reign of Domitian. He lived to an advanced age, and it is probable that he spent the later years of his life at Chæronea, where he was a magistrate and also a priest of Apollo. He married Timoxena, a lady of his native city, and had five children, to one of whom, Lamprias, is attributed the catalogue of his productions. Fabricius conjectured that he died when 70 years old, in the reign of Hadrian. The great work of Plutarch is his "Parallel Lives." In this he writes a biography of a Greek and of a Roman, and then makes a comparison between the two, although in some cases the comparisons are now lost. There are 46 of these lives extant. The other works ascribed to him, numbering about 60, are ranged together under the general title of *Moralia*, but 11 of them are on historical subjects. The first edition of the "Lives" in the Greek text appeared at Florence in 1517. One of the best editions is that of Sintenis (5 vols. 8vo, Leipsic, 1839-'53). Of the numerous translations, the French one of Amyot was rendered into English by Sir Thomas North in 1612. Dryden's translation is really the work of other hands. There is another English translation by John and William Langhorne. A revision of Dryden's was edited by Arthur Hugh Clough (5 vols. 8vo, Boston, 1859). The first edition of the *Moralia*, very incorrect, was that of the elder Aldus (fol., Venice, 1509); the best is that of Wyttenbach, (8 vols. 4to, Oxford, 1795–1821). It has been translated into French by Amyot, into German by Kaltwasser, and into English by Howard and others (London, 1603; new ed., corrected and revised by W. W. Goodwin, 5 vols., Boston, 1870). The first edition of the complete works is that of H. Stephens (13 vols. 8vo, Geneva, 1572).

PLUTO, in ancient mythology, the god of the lower world. He was a son of Saturn and Rhea, and was brother of Jupiter and Neptune, and when the world was divided among the three he obtained for his share "the darkness of night." His wife Persephone or Proserpine was violently carried from the upper world. (See PROSERPINE.) Of all the gods, he was the most hated by mortals, and his temples and statues were not numerous. In Homer he is always called Hades, but among the later Greek writers that term came generally to be applied to the abode of the dead itself. By the Roman poets Dis, Orcus, and Tartarus are used as synonymous with Pluto.

PLUTUS (called also Pluton), in ancient mythology, the god of wealth. He was the son of Jasion and Ceres, and is said to have been blinded by Jupiter so that he might distribute his gifts without regard to merit, he having previously granted them to the good exclusively. When coming to mortals he is slow-footed and lame, when going from them swift-winged. He was usually represented as a boy with a cornucopia.

PLYMOUTH. I. A S. E. county of Massachusetts, bordered E. by Massachusetts bay and S. partly by Buzzard's bay, and watered by Taunton and North rivers; area estimated at 700 sq. m.; pop. in 1870, 65,365. Its soil is not fertile. It is intersected by the Old Colony and Cape Cod railroads and branches. The chief productions in 1870 were 8,924 bushels of rye, 50,462 of Indian corn, 20,080 of oats, 94,766 of potatoes, 197,129 lbs. of butter, and 17,525 tons of hay. There were on farms 1,637 horses, 3,263 milch cows, 1,384 working oxen, 2,059 other cattle, 1,986 sheep, and 21,174 swine. There were 608 manufacturing establishments, employing $5,992,500 capital, and producing goods to the value of $19,859,796. The most important were 159 of boots and shoes, 4 of cordage and twine, 6 of cotton goods, 13 of hardware, 44 of iron in various forms, 57 of lumber, 3 of cotton machinery, 2 of woollen goods, and 3 of rolled zinc. Capital, Plymouth. **II.** A N. W. county of Iowa, bounded W. by the Big Sioux river, which separates it from Dakota, and intersected by Floyd river; area, about 850 sq. m.; pop. in 1870, 2,199. The surface consists of rolling prairies. It is intersected by the Sioux City and St. Paul railroad and the Iowa division of the Illinois Central. The chief productions in 1870 were 34,761 bushels of wheat, 22,048 of Indian corn, 22,741 of oats, and 15,480 of potatoes. There were 561 horses, 533 milch cows, 1,434 other cattle, and 336 swine. Capital, Plymouth Centre.

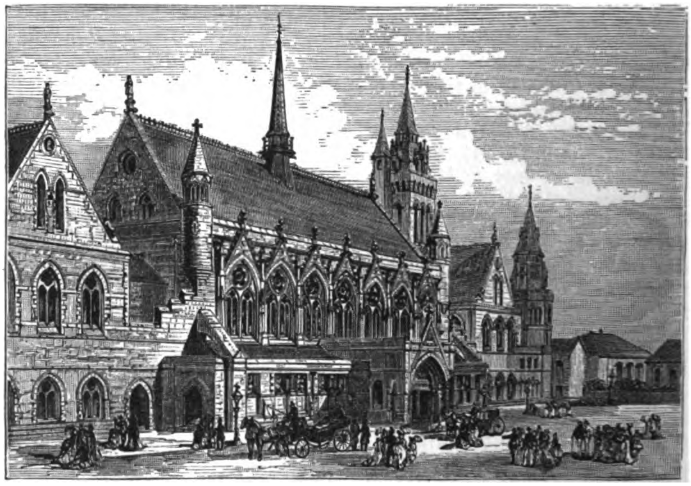
PLYMOUTH, the shire town of Plymouth co., Massachusetts, a port of entry, on Plymouth harbor and Cape Cod bay, at the terminus of a branch of the Old Colony railroad, 37 m. S. by E. of Boston; pop. in 1850, 6,024; in 1860, 6,272; in 1870, 6,238. The town is the largest in the state in point of area, extending on the coast about 18 m. from N. to S. Plymouth village is at the N. end of the town, and is compactly built, chiefly of wood. The harbor, which is large but shallow, is formed partly by a beach 3 m. long, which extends N. and S., and protects it from the waters of Massachusetts bay. About 30 vessels are employed in the bank cod fishery, besides which the chief business is manufacturing, the town containing one of the largest cordage factories in the United States (noted for the excellence of its productions), a manufactory of lines and twine, four extensive manufactories of rivets, tacks, nails, and plate iron, two zinc rolling mills, three manufactories of steel shanks, one of hammers, two of cotton duck (widely known for the superior quality of their products), one of woollens and flannel, one of cotton cloth, two of batting, two of shoes, one of nail kegs and boxes, one of boxes, barrels, &c., with planing mill combined, a machine shop, and a large iron foundery, producing stoves and hollow ware. The most noted edifice is Pilgrim hall in Court street, built in 1824–'5, which contains a large hall, the public library, and curiosities relating to the pilgrims of the Mayflower and other early settlers of Massachusetts. The burying hill, where some of the pilgrims were interred, is a place of interest. Cole's Hill is noted as the spot where nearly half their number were buried the first winter, but no trace of their graves was preserved. The county court house and house of correction are fine buildings.

Canopy over Plymouth Rock.

The town has a fire department, water works, six hotels, two national banks with a joint capital of $450,000, two savings banks with about $2,500,000 deposits, one high, three grammar, and 22 graded schools, three private schools, two weekly newspapers, and 16 religious societies. It is a place of considerable summer resort.—Plymouth is the oldest town in New England. The pilgrim fathers landed here Dec. 11 (O. S.), 1620. A portion of the rock on which they first stepped has been placed in front of Pilgrim hall and surrounded by an iron fence. The rock itself is in Water street, and is covered by a handsome granite canopy. The national monument to the pilgrims, the corner stone of which was laid Aug. 1, 1859, will be ready by October, 1875, to receive the colossal statue of "Faith" by which it is to be surmounted.

PLYMOUTH, a town and the capital of Washington co., North Carolina, situated on a small creek, a few miles S. of Roanoke river, where it enters into Albemarle sound, 105 m. E. of Raleigh; pop. in 1870, 1,389, of whom 807 were colored. Early in 1862 Plymouth, with the neighboring region, fell into the hands of Burnside's North Carolina expedition, and was retained till April, 1864, when it was invested by the confederates under Gen. Hoke. On the 20th the iron-clad ram Albemarle ran down the river, sunk one Union gunboat at Plymouth, and drove off the other. The garrison, 1,600 strong, being cut off from communication with the fleet, surrendered after a severe conflict, in which the confederates lost heavily. On May 5 the Albemarle, with a tender, emerged from the river, and attacked the Union gunboats in the sound, but was driven back, her tender being captured. On the 25th an unsuccessful attempt was made to destroy the Albemarle by a torpedo. In October Lieut. W. B. Cushing formed a plan to blow up this vessel, which at that time formed the principal defence of Plymouth. On the 27th, with a party of 13 men, he embarked in a torpedo boat, crept up the river, put the torpedo in place, set fire to it just as he was discovered, and entirely destroyed the Albemarle. His boat was filled with water flung up by the explosion. He and his men sprang overboard and tried to swim to the shore amid a fire of musketry. Of his party all but himself and one companion were killed or captured. Though slightly wounded, he gained the shore, hid himself until night in the thickets, and then found a skiff in which after eight hours' paddling he reached the Union vessels at the mouth of the river. On the 31st the fleet was moved up the river, and Plymouth was occupied without resistance, the confederate force in North Carolina having gone to Virginia.

PLYMOUTH, a fortified seaport of Devonshire, England, at the head of the sound of the same name, on the river Plym, 190 m. W. S. W. of London; pop. in 1871, 68,080. The sound, about 3 m. long by 3 m. wide, is an inlet of the English channel, and receives the estuaries of the Plym and the Tamar. Its coast is generally rocky and abrupt, and the rocky island of St. Nicholas rises out of the water at its head, near the N. shore. On the W. side is Cawsand bay; and further up in the N. W. corner of the sound is the estuary of the Tamar, which is called Hamoaze, and forms the harbor for ships of war. The estuary of the Plym or Laira forms another harbor, which is called Catwater; it is capable of containing 1,000 ordinary vessels, and is generally used as a harbor for merchant ships and transports. The Catwater opens into the N. E. corner of the sound, and is not so deep as Hamoaze. Sutton pool is a tide harbor, also used by merchant vessels; and a pier at Mill Bay, on the opposite side of the town, accommodates the largest steamships at all states of the tide. The harbor of Hamoaze is 4 m. long, has moorings for nearly 100 sail of the line, and 15 fathoms of water at ebb tide. A breakwater 1,700 yards long protects the sound against gales from the southward. (See BREAKWATER.)



Guildhall, Plymouth.

—Taken in its widest sense, the name Plymouth comprehends what are called the "Three Towns," viz., Plymouth proper, Devonport, the seat of the great naval dockyard and arsenal, and Stonehouse. Plymouth proper is very thriving and handsome, covering about 1 sq. m. The royal hotel is an extensive structure with a theatre and assembly rooms attached, erected by the corporation of the town at a cost of £60,000. A new guildhall and law courts were opened in August, 1874. The number of places of worship in 1872 was 46, of which 12 belonged to the church of England. Plymouth is the seat of a Roman Catholic bishop. In the Cottonian public library there are many rare and valuable works, a large collection of manuscripts, paintings, drawings, &c. The town is supplied with water brought from Dartmoor by a channel nearly 30 m. long. The manufactures, with the exception of those connected with the naval establishments, are of little importance. The fisheries are very productive. The imports for the year 1872 were valued at £1,385,794, the exports at £76,437. The number of vessels entering the port in 1871 was 738, tonnage 123,445; cleared 495, tonnage 61,345. Several lines of ocean steamships touch at or ply from and to Plymouth; but the place owes its chief importance to the works in the most important division of the town. (See DEVONPORT.)—Plymouth was a place of some importance as far back as 1438. The British fleet rendezvoused here at the time of the threatened invasion of the Spanish armada (1588), and the port furnished a larger quota of vessels for defence than any town but London. It sided with the parliament against Charles I., and was several times unsuccessfully besieged by the royal forces.

PLYMOUTH BRETHREN, a Christian denomination, called by themselves simply Brethren, and sometimes called also Darbyites after one of their leaders. They have no written creed or confession, and every one is allowed entire freedom of belief; yet they hold the total depravity of man, the necessity of regeneration by the Holy Spirit, and the atonement by the sufferings and death of Christ. They believe that Christianity is in ruins, as appears in the sectarian divisions; and that believers should withdraw from the churches, and meet in separation from all ecclesiastical evil. They reject any special designation or ordination to the office of the ministry, regarding all true Christians as priests, who, if they are found able to edify the brethren, are authorized to preach and administer the sacraments without any human call or ordination. As a body they practise adult baptism only; they do not make it a condition of membership, yet generally convince their members of the importance of being rebaptized. They partake of the Lord's supper every Sunday morning, and believers only are expected to meet then. In the afternoon or evening they preach to such as are not yet converted; but they consider pleading out of place in the assembly of believers. They regard the work of pastors and evangelists as distinct, and allow the payment of the latter while itinerating, but consider the payment of pastors as unscriptural. The denomination originated almost simultaneously in Dublin, Plymouth, and Bristol. In 1829 a number of Christians in Dublin were accustomed to meet for religious improvement, and adopted the principle that they were free to celebrate the Lord's supper without the help of any ordained minister; but they did not separate themselves from the churches of which they were members. In 1831 a similar society was formed in Plymouth, which became a separate and complete ecclesiastical organization. In 1832 John W. Darby, a curate of the established church of England, left his ministry and joined the Dublin society, but subsequently became the leading member of the Plymouth society. Before the formation of the Plymouth brotherhood George Müller, the founder of the well known orphan house, had advocated similar ideas in Teignmouth, and in 1832 he organized the Bethesda society at Bristol. These different societies increased in numbers and influence, particularly that in Plymouth, which gained perhaps 1,500 believers. They soon became divided into three parties. At the head of one of them was Darby; at the head of a second Newton, whose peculiar doctrines respecting the person of Christ were generally repudiated by the denomination as heretical, and afterward retracted by the author, who subsequently withdrew from the denomination. Among the other congregations which refused to be involved in the bitter personal controversies between Newton and Darby, the Bethesda congregation of Bristol was prominent. Notwithstanding their internal divisions, they made great progress in Great Britain, where in 1850 they had 132 places of worship. Societies varying from a small number to many hundreds were established in most of the cities and large towns of England, Scotland, and Ireland, also in remote country districts and villages. Darby was induced in 1838, by the opposition which he met in England, to remove to Switzerland. He gathered adherents in almost every town of the canton of Vaud, and in several towns of Geneva and Bern. A French periodical, *Le témoignage des disciples de la parole* (afterward called *Études scripturaires*), was started for the propagation of their tenets, and a kind of seminary established for training missionaries. They suffered some losses from the political revolution in the canton of Vaud in 1845, and later from the organization of a free reformed church. From Switzerland they spread into France, where they established congregations in Paris, Lyons, Marseilles, and other places. They were still more successful in Italy after 1848, where nearly all the numerous so-called free evangelical associations adopted their principles to a greater or less extent. A few scattered congregations were gathered in Germany, Cape Colony, Australia, New Zealand, and Canada. They made their appearance also in the East Indies, where Bishop Wilson of Calcutta published a pastoral letter against them. In the United States, societies were formed in Philadelphia and other places. No accurate estimate of their numbers can be made, as they are without formal organization. —See Estéoule, *Le Plymouthisme d'autrefois et le Darbyisme d'aujourd'hui* (Paris, 1858); Mrs. H. Grattan Guinness, "Answer to the Question: Who are the Plymouth Brethren?" (Philadelphia, 1861); Edward Dennett, "The Plymouth Brethren: their Rise, Divisions, Practice, and Doctrines;" D. Macintosh, "The Special Teachings, Ecclesiastical and Doctrinal, of the Plymouth Brethren, compiled from their own Writings, with Strictures."

PNEUMATIC DESPATCH, a contrivance for sending packages through tubes by means of atmospheric pressure. The first idea of a plan for pneumatic transmission appears to be due to Denis Papin, who in 1667 presented a paper to the royal society of London on the "Double Pneumatic Pump." This consisted of two large cylinders to exhaust the air from a long metal tube containing a travelling piston, to which a carriage was attached by means of a cord. More than a century elapsed before any further effort in this direction was made. Panckouke's *Dictionnaire encyclopédique des amusements des sciences* (1792) gives a description of a machine by M. Van Estin, by means of which a hollow ball holding a small package was propelled by a blast of air through a tube several hundred feet in length and having many curves. This plan seems, however, to have been more an amusement than an attempt to introduce an industrial scheme. With more regard to practical results, Medhurst, an engineer of London, published a pamphlet on the subject in 1810. He proposed to move small carriages on rails in air-tight tubes or tunnels, by compressed air from behind, or by creating a partial vacuum in front. In 1812 he published another pamphlet, but the plan was not put into successful operation, principally from insufficient means of exhaustion. About 1832 he proposed to connect the carriage inside of such a tube with a passenger carriage running on the top of the tube; and although the latter project has never been commercially successful, it was the first to be practically attempted. (See Pneumatic Railway.) More than a score of patents were taken out on the continent and in England and America, none of which met with any practical success. Returning to the original idea of Denis Papin, inventors attempted to accomplish pneumatic transmission by moving the load inside the tube, and in course of time achieved success. In France MM. Jarroux and Taisseau presented a project for atmospheric telegraphy before the academy of sciences, and they were succeeded in the same direction by MM. Brochet and Ador. In 1857 Mr. Latimer Clark patented in England his system of pneumatic transport, and in 1858 he laid down a tube in London between Moorgate street and the general post office. Several stations were connected by a line of tubes in which cylindrical carriers holding despatches were placed. The cylinders were surrounded by India-rubber bands to make them fit accurately, and a partial vacuum was created in front, and compressed air was also employed to act behind. In 1860 M. Sébillot of Paris published a scheme by M. Kieffer, his pamphlet being entitled "A Reform in the Postal Service of Paris."—In England, in 1861, an iron tube, somewhat semi-cylindrical, about 30 in. in diameter and a quarter of a mile long, was laid down near Battersea, with gradients and curves like an average road. Iron carriages were made to fit the tube by means of flexible flanges, and a centrifugal fan moved by a steam engine constituted the exhausting apparatus. It was found that two iron carriages of about 7 cwt. each could in this way be driven at a speed of about 30 m. an hour. A pneumatic despatch company began operations in 1863. The experimental tube was removed from Battersea and laid down with some additions from the Euston station of the London and Northwestern railway to the N. W. district post office, a distance of about a third of a mile. The packages were blown through the tube to the N. W. station by compressed air, but moved in the other direction by the excess of normal atmospheric pressure against a partial vacuum. This system has been extended to embrace several miles of tunnel about 4½ ft. in diameter, besides about 13 m. of small pneumatic tubing for sending telegraph messages between various stations. The pneumatic tunnel extends from the station at Euston square to the general post office in St. Martin's-le-Grand. The central station is in Holborn, where the machinery for driving the package trains is placed. The distance between Holborn and Euston square is a mile and three quarters, and that between Holborn and the post office 306 ft. less than a mile. The tubes have a horse-shoe cross section, 4 ft. 6 in. high with an area of 17 sq. ft. The straight portions are of cast iron, and the curves of brickwork faced with cement. The chief gradients in the Euston square section are 1 in 45 and 1 in 60; those in the post office section are 1 in 15. The carriages weigh 22 cwt. and are 10 ft. 4 in. long, having a cross section conformable to the tube, leaving a space of about an inch all around, occupied by a flange of India rubber which causes a carriage to fit the tube in the manner of a piston. The trains are drawn from Euston square and from the post office by exhaustion, and driven to those stations by pressure. The engine is supplied by three boilers, each 30 ft. long and 6 ft. 6 in. in diameter. The experiments by Mr. Barlow, consulting engineer to the Midland railway company, led him to conclude that the greatest working economy was in moving a great amount of weight at a low speed, on the high as well as the low gradients. The system can transport over the whole line, allowing for delays, an average of a ton per minute. By means of an improvement invented by Messrs. Siemens and Halske, while a current of air circulates through any number of stations, a carriage may be introduced or stopped at any intermediate station.—In Paris a system of pneumatic transmission was decided upon in 1865, and an experimental line was laid between the place de la Bourse and the Grand Hôtel (boulevard des Capucines) in 1866. It was found by experiments that the water of the town could be used to produce, by being forced into reservoirs, or allowed to run from them, alternate compression and expansion of air in connecting reservoirs, the action being changed at will by a system of cocks; and this was the mode adopted for the propulsion of packages through the tubes. Since then a complete and comprehensive system has been carried out from time to time, the motive power in many of the recent extensions, however, being steam. In 1874 the station in the place du Havre was connected with the one at the Grand Hôtel, and the water at this station was employed to produce pressure and vacuum for working in both directions. There are now (1875) 45 stations in the city, and the number of despatches of all kinds transmitted is about 25,000 a month, or an average of 830 a day, of which the Bourse station sends over 2,500.—A pneumatic despatch system is now (July, 1875) in operation in the Western Union telegraph building at the corner of Broadway and Dey street, New York. The moving of the packages is done by exhausting, accomplished by a Root's rotary blower. Packages are sent from all parts of the building to the operating room in the seventh story, but most of them from the receiving room on the ground floor. In the centre of the operating room stands a chest about 5½ ft. high, 18 in. wide, and about 12 ft. long. The upper part of it, about 6 in. deep, forms one chamber, connecting by openings, which may be closed or shut at pleasure, with a dozen or more chambers beneath. A large exhaust pipe about 8 in. in diameter descends from the middle of the upper chamber to the exhausting engine in the basement. From each receiving desk in the room below a tube about 1½ in. in diameter descends to the floor, and then bending in a gradual curve is carried to the centre of the building, where it ascends vertically with its two dozen fellows to the chest in the operating room. Each compartment in the chest receives two tubes. A cylindrical box about 6 in. long and 1½ in. in diameter, made of stout leather and open at one end, with a flange at one or both ends, as may be preferred, so as nearly to fit the tube, is used as the carrier for the light paper parcel, which is rolled up and held to its place inside the box by its elasticity. The weight of the whole load is but a few ounces, and consequently it needs a propelling force of less than half a pound to the square inch to force it up the tube with considerable velocity. At the orifice in the chamber of the exhausting chest is a bent spring, which arrests the box at its exit, so that it falls with little force in the chamber, at the same time that a lever is moved which closes a galvanic circuit, by which means an alarm is rung to call a messenger.

PNEUMATIC RAILWAY. Since the plan of Medhurst mentioned in the preceding article, it has been sought to connect a passenger carriage with a pneumatic tube so as to afford a practical method of transit, and many patents have been taken out. The plan of Clegg and Samuda, patented in England in 1838, was one of the first invented, and is still as good as any since proposed. It was adopted on the atmospheric railways of Kingstown in Ireland, Croydon in England, and St. Germain in France. Along the upper side of the pneumatic tube there was a slit running throughout its entire length. Over this slit was placed a strip of flexible leather fastened hinge-like on one side. Beneath the continuous leather strip there were short pieces of iron plating placed end to end, which just fitted into the slit, and on the upper side were plates of iron, somewhat wider than the slit. A knee-shaped piece of iron connected with the passenger carriage passed beneath this continuous valve, and was attached to a cylinder several feet long, which acted as a piston, fitting the inside of the pneumatic tube by means of an India-rubber flange. The piston and pipe were lubricated with tallow. It was difficult to keep the apparatus in order, and notwithstanding that a speed of over 30 m. an hour was attained, the enterprise in this form has been abandoned. But it has been proposed in another form, which is essentially the same as that of the postal pneumatic despatch. In the summer of 1864 Mr. Rammell, C. E., constructed a brickwork tunnel on the crystal palace grounds at Sydenham, England. The tunnel was about 10 ft. high by 9 ft. wide, and capable of admitting the largest carriage on the Great Western railway. Rails were laid upon the bottom of the tunnel, which was about 600 yards long. The route was laid with severe gradients and curves, to afford a practical test. A carriage capable of holding 30 passengers was provided with a flange of bristles at each end, by which it was made to fit the brickwork of the inside of the tunnel with such accuracy as to allow of the accumulation of sufficient pneumatic force to propel it. A small stationary steam engine worked a fan in the form of a hollow disk 22 ft. in diameter, so arranged as either to condense or rarefy the air in the tunnel. It is thought that much of the objection against the old system of Clegg and Samuda has been overcome by Rammell's adoption of the pneumatic despatch system. In the old system the pressure required within the pneumatic tube was from 8 to 10 lbs. to the square inch, while when the tube receives the whole car a pressure of 2 or 3 oz. is all that is required to carry it over a steep gradient. The smoke and bad air of ordinary passenger tunnels traversed by locomotives are avoided, as the pneumatic carriage carries its own supply of pure air, and drives the foul air before it.

PNEUMATICS (Gr. πνεῦμα, wind, air), that branch of general mechanics which treats of the equilibrium and motion of aëriform fluids. Many portions of this subject being embraced and treated under special topics, as AIR PUMP, ATMOSPHERE, BALLOON, BAROMETER, BLOWING MACHINES, BOILING POINT, CHIMNEY, DIVING BELL, EXPANSION, EXPLOSIVES, FURNACE, GAS, HEAT, WIND, &c., a statement of the general theory only, with such applications as are not elsewhere made, will here be in place. Many gases, as the air, are permanent, preserving their gaseous form under all degrees of temperature or compression to which they have yet been subjected. Other gases, as chlorine and ammonia, by the agency of cold and pressure, change their state, become liquids or solids, and for the time, of course, lose the peculiar properties of the aëriform condition; these are non-permanent gases. As ordinarily understood, pneumatics treats of the action only of bodies in the form of permanent gases of which atmospheric air is the type; but the principles of this science can be so extended as to investigate the elasticity and action of the vapors and non-permanent gases, through all stages of condensation, down to the liquid condition. Except when otherwise stated, the principles which follow will relate to the permanent gases only.—The distinguishing characters of these bodies grow out of the fact that their molecules do not sensibly cohere, but can move with perfect freedom both about and away from each other; and that between these molecules there are repulsive forces greatly exceeding any forces of attraction which may act, causing them at all times to strive to recede from each other. From these circumstances the following principles are deduced: 1, all gases can be compressed, or if allowed will expand, and so far as yet known, in the case of perfect gases, to an indefinite extent; 2, when compressed, a perfect gas will always exert a pressure in the contrary direction, or against the compressing force, thus manifesting the peculiar form of elasticity possessed by these bodies, or what is called their expansive force, the measure or amount of which for a given case is termed the tension of the gas or vapor; 3, wherever a gas or vapor is found to exist as a body, having appreciable density, this is the result of some confining pressure applied to it from without, and compelling its particles into a certain degree of proximity; 4, when a body of gas does not expand, this is because the pressure from without equals and balances its tension at the time; and 5, when a body of gas is at rest throughout all its parts, this is because at every point the various pressures exerted in different directions are in equilibrium. From the foregoing laws, and also from the fact that the particles of a gas possess weight as well as those of a liquid, the following laws also result: 1, equal pressures in every direction are exerted upon and by every portion of a gaseous body at rest; 2, a pressure made on a confined body of gas, as in a liquid mass, is perfectly transmitted in every direction, and in the atmosphere to great distances; 3, such pressure is proportional to the area of surface receiving it, and consequently multiplied when the receiving surface is larger than that communicating it; 4, pressure on a given surface at a given depth, due to weight, is calculated in a similar way; 5, the free surface of any such body, as the upper aërial surface, tends to a level at any place; and 6, within any body of gas, at any given depth, there is exerted a supporting or buoyant power, which is as the density or tension of the gas at the place.—The weight of a column of air resting on a horizontal square inch, at the sea level, is, at an average temperature, very nearly 14·6 lbs.; and a pressure of this amount is termed a pressure of one atmosphere. The first pneumatic law, discovered by Boyle in 1650, and independently by Mariotte in 1676, and known as Boyle's and Mariotte's law, affirms that, at a given temperature, the volume of an aëriform body at rest is inversely as the compressing force. Direct consequences are, that the density and the tension are proportional to the compressing force. As the density of the air is about $\frac{1}{778}$ that of water, it follows from this law that if we could subject it to a pressure of 778 atmospheres, or about 11,320 lbs. to the square inch, its density would equal that of water. Whether under such circumstances it would still remain a gas, is not known. The second great law of tension and pressure is that of Dalton and Gay-Lussac (1801), by both of whom it was independently discovered, according to which, when the tension of a gas or vapor is constant, the density diminishes as the increase of temperature; in other words, for equal increments of temperature, a gas or perfect vapor expands by the same fraction of its own bulk; this being $\frac{1}{490}$ of its volume at 32° F., and for each degree above that point, or about three eighths of its volume between 32° and 212°. However long any permanent gas may be kept under pressure, its tension remains unimpaired. The laws of Mariotte and Dalton have been modified by the discovery that vapors and non-permanent gases undergo compression in a ratio greater than that of the increase of pressure upon them, and that near the point of liquefaction this deviation becomes very great. More recently, Mariotte's law has been found to need still further qualifications. Despretz (1829) announced that carbonic acid, ammonia, cyanogen, and some other gases, undergo at ordinary temperatures a compression more rapid than that of the increase of pressure, and in a ratio uniformly increasing; while above 14 atmospheres the result with hydrogen was the opposite. Regnault has confirmed these results, and has even shown a deviation from the law in the case of a confined body of pure air. He obtained, for instance, a 10 and 20 fold density of air by applying respectively 9·9 and 19·7 atmospheres of pressure; of carbonic acid, by 9·2 and 16·7 atmospheres; of hydrogen, by 10·05 and 20·26. It follows that Mariotte's law is to be accepted as but approximately true, the variations being different for different gases; but the deviation in the case of non-permanent gases, such for example as carbonic acid gas, decreases as the temperature is raised, and at the boiling point of water it is much less than at ordinary temperatures. The conclusion of modern physicists is, that there is for each gas a certain normal temperature at which it exactly conforms to Mariotte's law, while above and below this temperature it varies in opposite directions. This deviation, however, especially in air, is so slight, that for ordinary determinations of the volume of gases, and in the use of air in manometers, or pressure gauges, it may be overlooked. (See MANOMETER.) The earth's atmosphere being subject to compression by its own weight, it results that at heights in it increasing in an arithmetical ratio the density and tension diminish in a geometrical ratio. All the relations expressed in Mariotte's law and its consequences are conveniently exhibited in a table like the following; and by including the last column, that of heights, the 0 of height being the sea level, and the height 1 denoting that experimentally found as 2·705 miles, all the relations in the first four columns become represented as they exist theoretically, and very nearly actually, in our atmosphere:

Pressures.	Densities.	Tensions.	Volumes.	Heights in the air.
1	1	1	1	0
½	½	½	2	1
¼	¼	¼	4	2
⅛	⅛	⅛	8	3
$^1/_{16}$	$^1/_{16}$	$^1/_{16}$	16	4
....	....	....	....	....
$^1/_{1024}$	$^1/_{1024}$	$^1/_{1024}$	1024	10
&c.	&c.	&c.	&c.	&c.

In the atmosphere, however, other causes of slight deviation from the relation of density to height exist. Among these are: 1, that the earth's attraction diminishes somewhat, about $\frac{1}{1000}$ part for each mile near the earth, at points taken in ascending through the atmosphere; 2, that the attractions of the sun and moon at some times and places conspire with, at others oppose, the action of the earth; 3, variations due to changing temperatures; 4, admixture of vapors, &c., in the lower atmosphere. The general effect is a slightly more rapid diminution of density than that above given, with increase of altitude.—Aëro-dynamic problems, or those investigating the flow and delivery of gases through orifices, in tubes, and in currents, and the consequences of the impact and momentum of moving air, are too intricate to be presented fully except in special treatises on the subject. Torricelli's principle for liquids, that the velocity of discharge from an orifice is that which the body of liquid would acquire in falling freely from the height of its surface to the centre of the orifice, applies quite as strictly to gases as to liquids. A heavy body, in falling through one foot, acquires a velocity of 8 ft. a second; and the velocities of discharge being as the square roots of the depths, and the height of the surface of a homogeneous atmosphere above the sea level being 27,720 ft., it follows that, at the latter level, the velocity with which air should jet into a vacuum through an opening not too small will equal nearly the product $8\sqrt{27,720}=1,332$ ft. Experiments show that the actual velocity, as in the case of water, is somewhat less; that for orifices in a thin wall it is about 65 per cent. of that named; for short cylindrical spouts, ·93; and for conical, narrowing outward, ·94. These facts correspond in a degree with the results in spouting liquids, and show that, as well as in these, the "contracted vein" exists in the efflux of gases. The movement of gases through pipes is also subject to retardation similar to that affecting the delivery of liquids; and roughness of the inside of tubes, sharp angles, inequalities of size, &c., here also increase the amount of retardation. This retarded flow has proved, unexpectedly, a chief difficulty in the way of using the pneumatic power transmitter proposed by Papin—in substance a hydrostatic press containing air, with a long pipe connecting the two pistons, so as to allow of action at distant points. So, in the case of a blowing tube constructed in Wales to catch the air impelled by a waterfall, and convey it to a distance, in order to feed the blast of a foundery, the time estimated for the delivery of the air being six seconds, it was found that the jet of air did not arrive until after the lapse of ten minutes, and it was then but feeble. The remarkable retardation of gases in tubes must be due in a considerable degree to adhesion of the gases to the solid surfaces, a principle well known; and Robison has also supposed much of it due to an undulation arising from this and other causes in the transmitted air. It is well ascertained that, besides varying in the force of horizontal movement, producing gusts, winds also undulate vertically, as do water waves. Moreover, winds are retarded by obvious causes near the surface of the earth, just as a stream of water flows slowly at its bottom; and thus they are always less violent in cities than in the country. Similar influences must modify their flow at the sides and above, and especially where winds flow in unlike directions along an aërial plane dividing them.

PNEUMONIA, Peripneumonia, or **Lung Fever,** inflammation of the proper substance of the lungs. Pneumonia is one of the most frequent forms of inflammation, and is common to all ages. It prevails more frequently in spring and autumn than in summer and winter, in cold and temperate than in tropical climates. The prolonged exposure to cold is the cause to which it is most frequently attributed, but in many instances careful research cannot assign an exciting cause; it occurs oftenest among the ill fed, the intemperate, and those who suffer from crowding and want of ventilation; consecutive pneumonia, as it is then termed, frequently arises in the course of typhoid, typhus, and eruptive fevers. In many cases the patient is feverish and unwell for three or four days before the actual invasion of the disease; this is almost invariably marked by well defined rigor, followed by pain in the side, cough, accelerated breathing, and fever. The pain in the side, commonly felt beneath the nipple, is no guide to the seat of the disease; it is generally caused by accompanying inflammation of the pleura, is lancinating, and increased by inspiration and by motion of the thorax; according to Grisolle, it occurred in 272 out of 301 patients. Accelerated breathing is an invariable symptom, the respirations varying from 30 to 50 in a minute, though they may be as frequent as 80. The pulse does not increase in the same ratio as the respiration; the ordinary relation of four pulsations to a single respiration is disturbed, and is reduced to three, two, or even less. Dr. Walshe says he has seen this perverted pulse ratio prove the first sign of pneumonia, appearing before crepitation or rusty expectoration. Cough is an almost invariable symptom, occurring commonly at the commencement of the disease; it is not paroxysmal, and is not aggravated at night. In a great majority of cases the cough is accompanied by expectoration, which is pathognomonic of the disease. It is tenacious, semi-transparent, little aërated, and of a lemon, orange, or rust color, according to the amount of blood with which it is combined. When free blood occurs in the expectoration, according to Walshe, the pneumonia is complicated by the presence of tubercles. As the disease subsides, the expectoration gradually becomes opaque and bronchial. In some cases the expectoration is diffluent, watery, and of a dark color resembling prune or liquorice juice. This is always a serious symptom. The pulse is most commonly frequent, full, and strong; the skin is hot; during the height of the disease the face is often deeply flushed, sometimes almost livid. The pathognomonic physical sign of the first stage of pneumonia is the crepitant rhonchus; this is fine, dry, equal, and heard chiefly at the end of the inspiration. To distinguish it fully it is often necessary to make the patient cough. In a short time the crepitant rhonchus is replaced by bronchial respiration; the breathing is loud, blowing, and tubular, and when the patient speaks the voice has the diffused resonance called bronchophony. At the limits of the bronchial respiration, while the inflammation is extending, the crepitant rhonchus is still heard. As bronchial respiration replaces fine crepitation, percussion becomes dull over the affected portion of the lung; at the same time the vibratory thrill felt by the hand placed upon the chest when the patient speaks becomes more marked. When pneumonia is central and the inflamed part of the organ is separated from the parietes by healthy lung tissue, both percussion and auscultation may give negative results. When the attack of pneumonia results in recovery, as the general symptoms diminish in intensity and the expectoration becomes white or grayish, the bronchial respiration becomes less strongly marked, and over the parts last attacked a coarser and moister crepitation recurs; this is the redux crepitant rhonchus. With the return of the crepitant rhonchus the percussion note becomes clearer, until gradually the lung recovers its former condition. When on the other hand the attack is fatal, the general symptoms, with the exception of pain, persist, and are aggravated; the expectoration becomes of a dirty gray color, striated, and finally perhaps wholly purulent; the complexion grows pale, yellowish, and earthy looking; the skin is covered with a viscid sweat, and death is preceded by the tracheal rhonchus. In general the intelligence remains unimpaired to the last. In rare instances abscesses are formed in the lungs as a consequence of pneumonia. The duration of the disease is rarely less than 7 or more than 20 days. Very fatal in young infants and in old people, it is attended with but little danger between the ages of 6 and 50, when uncomplicated and occurring in patients of good constitution. When pneumonia is double, when it is complicated with heart disease, with albuminuria, or with delirium tremens, when it occurs in constitutions deteriorated by fatigue, privations, or excess, its gravity is very greatly increased. It sometimes occurs as an epidemic, and is then severer than when it is sporadic.—In strong, healthy, young adults, a single full bleeding will often relieve the breathing, remove the pain, and diminish the force and frequency of the pulse; in other cases, where the pain in the side is severe, it is best to have recourse to cupping glasses. Afterward small doses of tartrate of antimony combined with morphia may be given every two or three hours. The patient should be kept in bed, the chest should be covered with an oiled silk jacket, and the diet should be bland but nutritious. Where patients are feeble, broken down, or advanced in years, general bloodletting is inadmissible, and even antimony must be used with great caution. A nutritious diet, and the administration of carbonate of ammonia, and frequently of stimulants, form in such cases the appropriate treatment.—Chronic pneumonia, except as an attendant upon tubercle or cancer, is exceedingly rare. In it the lung becomes dry, gray, reddish, or black, indurated, and impermeable to air. It may occur as a primary disease, or may follow an attack of acute pneumonia. The patient gradually loses flesh and strength; there is cough with trifling expectoration and no hæmoptysis, and slight but irregular fever. The physical signs are dulness on percussion over the affected part, with feeble, harsh, or bronchial respiration, and increased vocal fremitus. When it affects the upper lobe of the lung, the diagnosis between chronic pneumonia and phthisis is very difficult. The disease is generally fatal.

PO (anc. *Padus* and *Eridanus*), a river of N. Italy, having its source in Piedmont, in two springs about 6,000 ft. above the sea, near lat. 44° 40′ N., lon. 7° E., on the E. side of Monte Viso, one of the Cottian Alps. It flows E. in a winding and irregular course for about 450 m. across the whole breadth of northern Italy, and enters the Adriatic by a delta, the most important branches of which are the Po della Maestra, Po di Volano, and Po di Primaro, between lat. 44° 35′ and 45° N., and lon. 11° 55′ and 12° 30′ E. It receives a great number of tributaries both from the Alps and the Apennines. The most important of the former are the Dora Riparia, Clusone, Sangone, Stura, Dora Baltea, Sesia, Tanaro (from the south), Ticino, Olona, Adda, Oglio, and Mincio; and of the latter, the Scrivia, Trebbia, Nura, Taro, Parma, Enza, Secchia, Panaro, and Reno. About 50 towns of considerable size are situated on its banks or those of its tributaries. Boats can ascend to within 60 m. of its source, but the current is so rapid as to render navigation difficult. Destructive floods are liable to happen at all seasons, and the flat country along its lower course renders artificial embankments necessary. Below Piacenza dikes have been formed, but extensive inundations occasionally happen. The bed of the Po is continually raised by its deposits, and this renders necessary a corresponding increase in the embankments, so that in many places the surface of the river is from 15 to 20 ft. higher than the adjacent country. The breadth of the Po from the Ticino to the delta varies from 400 to 600 yards, and the depth from 12 to 36 ft. Its basin includes an area of about 40,000 sq. m., and comprises the whole of Piedmont and Lombardy, parts of southern or Italian Tyrol, western Venetia, and the Swiss canton of Ticino, a part of the canton of Grisons, the former duchies of Parma and Modena, the territories of Bologna, Ferrara, and Ravenna, and a small part of Tuscany. Fish abound, including salmon, shad, and sturgeon.

POACHING. See GAME LAWS.

POCAHONTAS. I. An E. county of West Virginia, intersected by Greenbrier river; area, 710 sq. m.; pop. in 1870, 4,069, of whom 259 were colored. It has an elevated and mountainous surface, being traversed by the Greenbrier range toward the west, and bounded S. E. by a main range of the Alleghanies, which separates it from Virginia. A large portion of the land is infertile. The chief productions in 1870 were 14,901 bushels of wheat, 6,334 of rye, 46,512 of Indian corn, 22,348 of oats, 65,740 lbs. of butter, 24,137 of wool, and 4,797 tons of hay. There were 1,815 horses, 2,440 milch cows, 5,742 other cattle, 10,824 sheep, and 2,789 swine. Capital, Huntersville. **II.** A N. W. county of Iowa, drained by Lizard and other small rivers; area, 625 sq. m.; pop. in 1870, 1,446. Its surface is rolling, and the soil fertile. It is traversed in the S. part by the Iowa division of the Illinois Central railroad. The chief productions in 1870 were 18,413 bushels of wheat, 32,860 of Indian corn, 11,015 of oats, 39,265 lbs. of butter, and 4,864 tons of hay. There were 374 horses, 596 milch cows, 1,280 other cattle, and 803 swine. Capital, Rolfe.

POCAHONTAS, an Indian woman of Virginia, daughter of the chief Powhatan, born about 1595, died in Gravesend, England, in March, 1617. She was remarkable for her friendship for the English colonists, a striking evidence of which is said to have been given when she was about 12 years old. Capt. John Smith was taken prisoner, and it was decided to put him to death. His head was laid upon a stone, and the savages were brandishing their clubs preparatory to dashing out his brains, when Pocahontas threw herself upon the captive's body, and her intercession with her father saved his life. Recent researches discredit this story. When Smith returned to Jamestown, he sent presents to Pocahontas and her father; and after this, according to Smith's narrative, Pocahontas "with her wild train visited Jamestown as freely as her father's habitation." In 1609 she passed through the wood in the night to inform Smith of a plot formed by her father to destroy him. In 1612 she was living in the territory of the Indian chief Japazaws. Capt. Samuel Argall bribed Japazaws to betray her into his hands, and began to treat with Powhatan for her restitution, but they were unable to agree. While she was on shipboard an attachment sprang up between her and an Englishman named John Rolfe, and the consent of Sir Thomas Dale and of her father having been gained, they were married at Jamestown in April, 1613. A peace of many years' duration between the English and the Indians was the consequence of this union. Before her marriage she was baptized, receiving the name of Rebecca. In 1616 she accompanied Dale to England, where she was an object of great interest to all classes of people, and was presented at court. When Smith visited her in London, after saluting him she turned away her face and hid it in her hands, and remained in this position for two or three hours. She had been taught to believe that he was dead, and there is no doubt that her husband was a party to the deception, he probably thinking she would never marry him while Smith was living. Pocahontas prepared to leave England with regret, but she suddenly died as she was on the point of embarking.

She left one son, Thomas Rolfe, who was educated by his uncle, a London merchant, and in after life went to Virginia, where he became a person of note and influence. The Bolling, Randolph, Fleming, and other families in that state are his descendants.

POCOCK, Edward, an English orientalist, born in Oxford, Nov. 8, 1604, died there, Sept. 10, 1691. He graduated at Oxford in 1622, studied the oriental languages, and prepared an edition in Syriac of the second epistle of St. Peter, the second and third of St. John, and that of St. Jude, parts of the Syriac New Testament which had not previously been edited. He was ordained priest in 1628, and went as chaplain of the English merchants in Aleppo, where he remained five or six years, studying Hebrew, Syriac, Ethiopic, and Arabic. Returning in 1636, he was appointed to the Arabic professorship in Oxford, founded by Laud, by whom he had been commissioned while in the East to procure ancient coins and manuscripts for the university. He went again to the East, remained at Constantinople nearly four years, and came home in 1640. Resuming his lectures and studies at the university, he was presented in 1643 to the rectory of Childrey in Berkshire. Charles I., while a prisoner in the isle of Wight in 1648, nominated him professor of Hebrew with a canonry of Christ Church added. In 1648-'50 he published *Specimen Historiæ Arabum*, consisting of extracts from Abulfaragius in the Arabic with a Latin translation and notes appended; and in 1655 appeared at Oxford his *Porta Mosis*, consisting of six prefatory discourses to the commentaries of Moses Maimonides upon the Mishnah. He assisted in the preparation of Walton's polyglot Bible, which appeared in 1657; and in 1658 he published at Oxford, in 2 vols. 4to, his Latin translation of the "Annals" of Eutychius. Soon after the restoration he published an Arabic version of Grotius's tract *De Veritate*, and an Arabic poem of Abu Ismael Thograi with a Latin translation and notes. His chief work was the translation of the *Historia Dynastiarum* of Abulfaragius, with the text and notes (2 vols. 4to, Oxford, 1663). He also published an Arabic version of the church catechism and liturgy (1674), "Commentary upon the Prophecies of Micah and Malachi" (1677), on Hosea (1685), and on Joel (1691). An edition of his theological writings, with an account of his life and works by Leonard Twells, M. A., was published in 1740, in 2 vols. fol.—His son EDWARD published in 1671, under his father's direction, the philosophical treatise of Ibn Tophail, with a Latin version and notes, afterward translated into English by Ockley. He also translated into Latin the work of Abdallatif on Egypt, but it was not published till 1800. Another son, THOMAS, made an English translation of the work of Menasseh ben Israel, *De Termino Vitæ* ("Of the Term of Life," 12mo, London, 1699).

POCOCKE, Richard, an English traveller, born in Southampton in 1704, died in Meath in September, 1765. He graduated at Oxford in 1731, began his travels in the East in 1737, and after his return in 1742 published "A Description of the East and some other Countries" (1743-'5), in 2 vols. fol., with 178 plates: vol. i., "Observations on Egypt;" vol. ii., part i., "Observations on Palestine, or the Holy Land, Syria, Mesopotamia, Cyprus, and Candia;" part ii., "Observations on the Islands of the Archipelago, Asia Minor, Thrace, Greece, and some other Parts of Europe." The whole work was inserted, without the plates, in Pinkerton's "Voyages and Travels," vols. x. and xv. In 1745 he was made archdeacon of Dublin, in 1756 bishop of Ossory, and in 1765 bishop of Meath.

PODIEBRAD, George, king of Bohemia, born April 23, 1420, died March 22, 1471. He was the son of Herant of Podiebrad and Kunstat, a Hussite nobleman. In his youth he engaged in the Hussite war; but while the Bohemian king and German emperor Sigismund lived he acted with the moderate party. After that monarch's death the Hussites repudiated the election of his son-in-law Albert of Austria, and chose as their ruler Casimir, brother of Ladislas III. of Poland. Albert drove the Hussites and Poles to Tabor, and began the siege of that fortress; but Podiebrad forced him to raise it and retreat to Prague. Among the Hussites he now became second only to Henry Ptaczek of Lipa, and after the death of that leader in 1444 he succeeded him as regent during the minority of Ladislas the Posthumous, Albert's son. For a long time he was engaged in conflicts with Meinhard of Neuhaus, the leader of the Catholics, but in 1450 the Calixtines triumphed, and in 1451 Podiebrad was recognized as ruler by the whole country. His authority was confirmed when the deputies of Hungary, Austria, and Bohemia met in Vienna to agree upon a plan for the government of their respective countries, and the guardianship of their common sovereign Ladislas. After the death of that monarch (1457) Podiebrad was elected king of Bohemia, March 2, 1458, had himself crowned by Catholic bishops, and maintained himself both against foreign and domestic enemies. When he ascended the throne he banished, according to agreement, the Taborites, Picards, Adamites, and other religious sects. Pope Pius II. annulled the compacts entered into between the Calixtines and the Catholics, and, Podiebrad evincing a determination to stand by the former, excommunicated him in 1463; but through the mediation of the emperor Frederick III. the contest was settled for a time. In 1466 the new pope, Paul II., excommunicated Podiebrad, and caused a crusade to be preached against him throughout Germany; and on this account the king of Bohemia in 1468 declared war against the emperor, and ravaged Austria as far as the Danube. The pope and the emperor, on the other hand, induced Matthias Corvinus, king of Hungary, to take up arms against Podiebrad, his father-in-law, and the Catholics of Bohemia were also excited to insurrection. Podiebrad recalled the exiled heretics, suppressed the domestic insurrection, drove back the Hungarians who had invaded his territory, and negotiated an armistice with Matthias in April, 1469. Matthias soon broke his agreement, and was chosen king of Bohemia by a mock diet held at Olmütz; but Podiebrad succeeded in having Ladislas, eldest son of Casimir IV., king of Poland, of the house of Jagellon, chosen as his successor. The war continued until an armistice was agreed upon in July, 1470; and on Podiebrad's death in 1471 he was succeeded by Ladislas, while his two sons, Victorin and Henry, became Bohemian nobles.—See Jordan, *Das Königthum Georg's von Podiebrad* (Leipsic, 1861).

PODLACHIA (Pol. *Podlesie*). See SIEDLCE.

PODOLIA, formerly a province of Poland, and now a government of Russia, bordering on Volhynia, Kiev, Kherson, Bessarabia, and Austrian Galicia; area, 16,224 sq. m.; pop. in 1870, 1,933,188. Kamenetz, or Kamieniec, the capital, is the only town of importance. An offset of the Carpathian mountains enters Podolia from Galicia and traverses it in a S. E. direction, but in no part exceeds 500 ft. above the sea. The surface in other directions is flat, with a general slope S. E. The principal rivers are the Dniester and Bog; the former constitutes the S. W. boundary, and the latter rises on the N. frontier and flows S. E. There are no large lakes, but small ones are numerous in the western part. The most valuable minerals are saltpetre, limestone, and alabaster. The climate is mild, and the soil particularly fertile. Grain, potatoes, hemp, flax, and tobacco are raised in abundance; and vines and mulberries succeed well. Large numbers of horses and cattle are reared. The inhabitants belong chiefly to the Greek church, but there are considerable numbers of Roman Catholics (12 per cent.) and Jews (11 per cent.), and some Protestants and Mohammedans. There are few schools.—Podolia became a province of Russia by the second partition of Poland (1793).

PODOPHYLLUM (Gr. *ποῦς*, a foot, and *φύλλον*, a leaf, its leaves bearing some resemblance to the foot of some web-footed animal), the botanical name of a plant of the order *berberidaceæ*, generally called May apple or mandrake, but in some localities known as wild lemon, Indian apple, and raccoon berry. It is a perennial herb, with a brownish creeping rootstock several feet long and about one fourth of an inch thick; from this arise both flowerless and flowering stems about a foot high, the flowerless bearing a single round seven- to nine-lobed leaf, fixed to the stalk by its centre and 6 in. or more across; leaves of this kind are called peltate, and the name of the species, *P. peltatum*, is due to this character. The flowering stems fork above, and bear two one-sided leaves with the stalk fixed near the inner edge; from the fork there hangs a white nodding flower, about 2 in. broad; it has three green bractlets at base, and six sepals, all of which fall early; the obovate petals are six to nine, in two or three series; the stamens twice as many as the petals; the pistil consists of an egg-shaped ovary with a sessile stigma, and becomes in fruit a pulpy berry one or two inches long, ovoid, and of a lemon-yellow color with some brownish spots; the numerous seeds are enclosed in a pulp, and the fruit, while it is much liked by some, is to others unpleasant. Our species is found in rich woodlands and marshy grounds from Canada to Louisiana; only one other species is known, which is a native of the Himalaya mountains. Its chief importance is as a drug, its use having rapidly increased with the last 20 years. The dried root has a narcotic and disagreeable odor and an acrid, nauseous taste. It is a powerful purgative, in the dose of 20 grains. The resin of podophyllum, or podophylline as it is often incorrectly called, when prepared by precipitating a concentrated tincture with water, is a brownish powder, and is comparatively pure. The officinal resin consists of two parts, one soluble and the other insoluble in ether. It is much used in medicine as a cathartic, in the dose of from a quarter of a grain to one grain. In larger doses it is apt to produce nausea and vomiting. It exerts its action principally on the upper part of the small intestines, and is thought by many to promote the action of the liver. It is used chiefly in derangements of the latter organ and in habitual constipation.

Mandrake or May Apple (Podophyllum peltatum).

POE, Edgar Allan, an American author, born in Boston, Jan. 19, 1809, died in Baltimore, Oct. 7, 1849. His father was the son of a distinguished officer in the revolutionary army, and was educated for the law; but becoming enamored of a beautiful English actress named Elizabeth Arnold, he married her, abandoned his profession, and went himself on the stage. The couple led a wandering life for a few years, and died within a very short time of each other, leaving three young children entirely destitute. Edgar, the second child, was a remarkably bright and beautiful boy, and was adopted by John Allan, a wealthy citizen of Richmond, who had no children of his own. He was educated with great care, and at the age of seven was sent to a school at Stoke Newington, near London, where he remained five or six years. After his return home he resided with the Allans at Richmond for three or four years, pursuing his studies under private tutors. In 1826 he entered the university of Virginia at Charlottesville, where he excelled in his studies and was always at the head of his class. At the end of a year he quitted the university, deeply involved in debt, chiefly incurred at the gaming table. For a year or two he now remained quietly at home; the story of his having gone to Greece to fight the Turks has no other foundation than the fact that his elder brother, who had gone to sea, got into some trouble with the police at St. Petersburg, from which he was rescued by the American minister. In 1829 Poe published at Baltimore his first volume of poems, "Al Aaraaf, Tamerlane, and Minor Poems," which attracted no attention, and, as his latest biographer, Mr. Stoddard, says, was not "a remarkable production for a young gentleman of 20." Subsequently Poe attempted to make the public believe that he was only 15 when the poems were written. Poe now desired to adopt the army as a profession, and Mr. Allan applied in his behalf to Gen. Scott, Chief Justice Marshall, and other powerful friends, through whose influence a cadetship was procured for him in the military academy at West Point. Here he totally neglected his studies, drank to excess, and was court-martialled and expelled, March 6, 1831. He now published by subscription, the subscribers being chiefly cadets, a new edition of his former volume, to which he added a few new poems. He returned to Richmond, and was again kindly received by Mr. Allan, who in the mean time had become a widower and had married a second wife. To this lady, who was young and handsome, Poe's conduct was such that Mr. Allan was forced to turn him out of doors; and dying soon after, in 1834, he left a will in which Poe's name was not mentioned. Thus thrown upon his own resources, Poe devoted himself to literature for a profession. Failing at first to earn a living by this means, he enlisted as a private soldier. He was soon recognized by officers who had known him at West Point, and they exerted themselves to procure his discharge, but he is said to have deserted before the application succeeded. Mr. Stoddard discredits this story, but has not been able to ascertain many facts of Poe's life for the two years following his expulsion from West Point. In 1833, the publisher of a literary journal at Baltimore having offered a prize of $100 for a tale in prose, and the same sum for a poem, Poe became a competitor and won both prizes. John P. Kennedy, one of the committee who made the award, furnished him with means of support and procured him employment as editor of the "Southern Literary Messenger" at Richmond. In this he labored for some time with industry, and wrote many tales and reviews; but at length his old habits returned, and after a debauch he quarrelled with the publisher and was dismissed. He married while in Richmond his cousin Virginia Clemm, a young girl as destitute as himself, and in January, 1837, removed to New York, where he lived precariously by writing for the periodicals, and in 1838 published a fiction entitled "The Narrative of Arthur Gordon Pym." In 1839 he went to Philadelphia and became editor of Burton's "Gentleman's Magazine." In this post he continued for a year, frequently quarrelling with Burton, who was at length forced to dismiss him. He next became editor of "Graham's Magazine," but in little more than a year quarrelled with the publisher and abandoned his post. He published about this time "Tales of the Grotesque and Arabesque" (2 vols., Philadelphia, 1840). He next went to New York, where, in February, 1845, he published in the "American Review" the poem of "The Raven," which made him favorably known. For a time he was employed by N. P. Willis and George P. Morris as sub-editor of the "Mirror," which post he gave up to become associated with Mr. C. F. Briggs in editing the "Broadway Journal;" but this association soon ended, and Poe continued the journal to the end of the second volume, when it stopped; and he was soon reduced to such straits that public appeals for pecuniary aid were made in his behalf by the newspapers. He was living at this time in a cottage at Fordham, Westchester co., N. Y. His wife died in January, 1848. In that year he published "Eureka, a Prose Poem," in which he endeavored to elaborate a system of cosmogony. In 1849 he went to Richmond, and there formed an engagement with a lady of considerable fortune. The day was appointed for their marriage, and on Oct. 2 he started for New York, to make preparations for his wedding. At Baltimore he met some of his former boon companions, spent a night in drinking, was found in the morning in the street in a state of delirium and taken to a hospital, where he died in a few hours.—Poe had an erect and somewhat military bearing, a pale, intellectual face, remarkably brilliant eyes, and a habitually sad expression. His tales have great merit, and exhibit a subtle faculty of analysis, and a wild, sombre, and morbid imagination, with absence of moral sentiment. The most remarkable are "The Gold Bug," "The Fall of the House of Usher," "The Murders in the Rue Morgue," "The Purloined Letter," "A Descent into the Maelstrom," and "The Facts in the Case of M. Valdemar." They have been translated into French. Besides "The Raven," his best known poem is "The Bells." The works of Poe were edited, with a memoir, by R. W. Griswold (4 vols., New York, 1850). The memoir contained many severe imputations upon his character, and gave many details of his misconduct, the accuracy of which has been often warmly questioned. In 1860 Mrs. Sarah Helen Whitman of Providence, to whom Poe was said to have been engaged not long before his death, published in defence of his character a volume entitled "Edgar Poe and his Critics." In 1874 the first volume of "The Works of Edgar Allan Poe" appeared in Edinburgh, edited with a memoir by John H. Ingram, who endeavors to show that Mr. Griswold was a slanderer, and that Poe was free from the faults imputed to him with the exception of occasional intoxication. A memoir by R. H. Stoddard, prefixed to a collection of Poe's poems (New York and London, 1875), throws new light on Poe's history, and shows his conduct in a somewhat more favorable light than that in which it was depicted by Griswold. Poe's grave, in Westminster churchyard, Baltimore, remained unmarked till 1875, when a monument was placed over it by the Baltimore school teachers.

POË BIRD, a tenuirostral bird of the subfamily *meliphaginæ* or honey eaters, and the genus *prosthemadera* (Vig. and Horsf.). The bill is long, curved, acute, slightly notched at the tip; wings moderate, the fifth and sixth quills equal and longest, the third and fifth more or less notched in the middle of the inner webs; tail long, broad, and rounded on the sides; tarsi short and stout; toes elongated, the outer united to the middle; tongue long, capable of being protruded, ending in a pencil of fibres of great service in extracting honey and insects from flowers. The poë bird, or *tui* (*P. Novæ Zealandiæ*, Strick.), is a native of New Zealand and the Auckland islands; it is about the size of a thrush, of a fine glossy black, with green and violet reflections; on each side of the neck are two small tufts of white loose feathers, elegantly rolled in spirals; these tufts have been compared to a pair of clerical bands, which, contrasting with the black color of the body, have obtained for it the name of parson bird. It is imitative, restless, and pugnacious, singing with sweet whistling notes; the flight is noisy and heavy; the food consists of flies and other small insects, worms, and the sweet juices of fruits; its flesh is said to be delicious; the nest is made in shrubs, of twigs and moss, and the eggs are four. It is called in New Zealand the mocking bird; in confinement it learns to speak long sentences with ease and fluency, and imitates a bark, mew, cackle, gabble, or any other sound. There are several allied species, like the friar bird of Australia (*tropidorhynchus corniculatus*, Lath.), whose notes resemble particular words, and the *pogonornis cincta* (Dub.) of New Zealand, which has remarkably long erectile tufts over the ears.

POERIO, Carlo, baron, an Italian statesman, born in Naples in April, 1803, died in Florence, April 28, 1867. He early followed his father into political exile, and was repeatedly under arrest after returning to Naples. Under the constitutional government of 1848 he was successively prefect of police and minister of education, and after its overthrow in May opposed the government in parliament till March, 1849, when he was tried with others by a special tribunal and sentenced to 24 years' hard labor, and was transferred from prison to prison with ever increasing indignity. Mr. Gladstone, while in Italy in 1851, denounced the injustice of Poerio's trial and the rigor of his prison life in a letter addressed to Lord Aberdeen, which created a profound sensation. Nevertheless Poerio was detained till the end of 1858, and was then released only on condition of going to the United States; but the captain of the American vessel on which he embarked landed him in England, where he remained. In 1859 he returned to Italy, where in the following year he was elected to the parliament of Turin, of which he became vice president in 1861. Although poor, he refused public office, and was one of the noblest of the Italian patriots. See *Morte di Carlo Poerio*, by Settembrini (Naples, 1867).—His brother ALESSANDRO died in 1848 from a wound received at the siege of Venice. His *Poesie edite e postume* appeared at Florence in 1852.

POET LAUREATE, a poet officially crowned with laurel. The custom of crowning the poets successful in a musical contest originated among the Greeks, and was adopted by the Romans during the empire. It was revived in the 12th century by the emperor of Germany, who invented the title of poet laureate. Henry V. crowned his historian, and Frederick I. the monk Gunther, who had celebrated his deeds in an epic poem. But no great interest was attached to the title until the coronation of Petrarch in the capitol at Rome in 1341. Tasso died just as the honor was about to be conferred on him. In Germany, the custom, after having apparently fallen into disuse, was restored by the emperor Frederick III., who crowned Æneas Sylvius Piccolomini and Conradus Celtes. Maximilian I. crowned Ulrich von Hutten, and gave to the counts palatine the right of bestowing the laurel crown in their own name; and when Ferdinand II. gave to the counts of the imperial court singly the right of conferring the laurel, its value declined. After Ulrich von Hutten, the most prominent poets crowned in Germany were George Sabinus, John Stigelius, Nicodemus Frischlin, and especially Martin Opitz, who in 1625 was crowned by Ferdinand II. at Vienna, and was the first who received the laurel for poems written in the vernacular tongue. The last poet crowned in that country was Karl Reinhard, editor of Bürger's poems. The imperial privilege was also given to universities, and the degree of *poeta laureatus* was conferred by continental and also by English universities. The French had royal poets, but no laureates. The title existed in Spain, but little is known of those who bore it. The early history of the laureateship in England is traditional. The common story is that Edward III. in 1367, emulating the crowning of Petrarch at Rome, granted the office to Chaucer, with a yearly pension of 100 marks and a tierce of Malvoisie wine. The legend probably arose out of an annuity of 20 marks granted by that monarch to his "valet Geoffrey Chaucer," with the controllership of the wool and petty wine revenues for the port of London, the duties of which he was required to perform in person. Henry Scogan is mentioned by Ben Jonson as the laureate of Henry IV. John Kay was court poet under Edward IV., and Andrew Bernard held the same office under Henry VII. and Henry VIII. John Skelton received from Oxford, and subsequently from Cambridge, the title of poet laureate; and Spenser is spoken of as the laureate of Queen Elizabeth, on the ground of his having received a pension of £10 a year when he presented her the first books of the "Faerie Queen." Up to this time the laureateship had not been established, nor can any certain trace of wine or wages be found. But the introduction into England from Italy of masques during the reign of Elizabeth rendered necessary the employment of poets, and in 1619 James I. secured the services of Ben Jonson by granting him by patent an annuity for life of 100 marks. Although not mentioned in the document as the laureate, he was doubtless deemed such. In 1630 the laureateship was made a patent office in the gift of the lord chamberlain, the salary was increased from 100 marks to £100, and a tierce of Canary wine was added, which was commuted in the time of Southey for £27 a year. From that time there has been a regular succession of laureates. The following is a list:

Ben Jonson.......	1630-1637	Colley Cibber.....	1730-1757
William Davenant	1637-1668	Wm. Whitehead..	1758-1785
John Dryden.....	1670-1688	Thomas Warton..	1785-1790
Thomas Shadwell.	1689-1692	Henry James Pye.	1790-1813
Nahum Tate......	1693-1714	Robert Southey...	1813-1843
Nicholas Rowe....	1714-1718	Wm. Wordsworth.	1843-1850
Lawrence Eusden.	1719-1730	Alfred Tennyson..	1850

As might be inferred from many of the names in this list, political considerations often controlled the appointment, and at length a strong feeling was raised in favor of its abolition. After the final derangement of George III. in 1810, the performance of the annual odes was suspended, and subsequently discontinued. On the death of Pye the office was offered to Walter Scott, who declined it and Southey was appointed with the virtual concession, which has since become the rule, that he should only write when and what he chose. Wordsworth wrote nothing in return for the distinction, and Tennyson has written little.

POETRY (Gr. ποιεῖν, to make), imaginative composition in metrical or highly fanciful language. In this work the history of poetry is treated in connection with the literature of the several nations of the world, and with the biography of individual poets.

POEY. I. Felipe, a Cuban naturalist, of French descent, born in Havana in 1802. He studied law in Madrid, where he was implicated in a political conspiracy, and fled to Paris. There he published in 1828 *La centurie des lépidoptères*, and helped to found the French entomological society. He returned to Havana after the revolution of 1830, was commissioned in 1837 to organize a museum of natural history and became one of its directors, and was soon afterward appointed professor of natural history in the university of Havana. In 1840 he published a school geography of the island of Cuba, and in 1842 a more comprehensive work on the same subject and a *Geografía universal*. In 1864 he published *Memorias sobre la historia natural de la isla de Cuba* (2 vols. 4to, Havana); the text is in Spanish, French, and Latin. In 1865 he commenced a monthly periodical entitled *Repertorio físico-natural de la isla de Cuba*, in which he has described upward of 230 new species of fishes, as well as the *ciguatera* or jaundice caused by eating certain Cuban fishes. He has also published some remarkable poems. He is a member of the Smithsonian institution and a corresponding member of the French academy of sciences. **II. Andres,** a Cuban meteorologist, son of the preceding, born in Havana in 1827. About 1846 he edited a literary journal entitled *El Colibrí*, but engaged in meteorological studies, and was for several years director of the physico-meteorological observatory of Havana, the chief object of which was the improvement of agriculture in Cuba. His principal works are: *Des caractères des éclairs en boule* (Paris, 1855); *Des tempêtes électriques* (1855); *Tremblements de terre à Cuba de* 1551 *à* 1855 (1855); *Catalogue des tremblements de terre dans les Indes Occidentales* (Versailles, 1858); *Observations sur la comète Donati* and *Répartition géographique des météores* (Paris, 1858); *Relation historique et théorie des images photo-électriques de la foudre observées depuis l'an* 360 *de notre ère jusqu'en* 1860 (1860); *Travaux sur la météorologie, la physique du globe en général, et sur la climatologie de l'île de Cuba et des Antilles* (1861); and *Table chronologique de quatre cents cyclones qui ont sévi dans les Indes Occidentales et dans l'Océan Atlantique nord depuis* 1493 *jusqu'en* 1855 (1862). Most of his works have been translated into Spanish after having been published in French. In the "Report of the Smithsonian Institution" for 1870, he published a memoir proposing a new classification of clouds, which included only two primary types in place of the three of Howard. (See CLOUDS, vol. iv., p. 712.) He is a corresponding member of the French academy of sciences. Lately he has become an ardent partisan of Comte's positive philosophy, and in 1875 commenced printing *La bibliothèque positiviste, exposition du positivisme.*

POGGENDORFF, Johann Christian, a German natural philosopher, born in Hamburg, Dec. 29, 1796. Devoting his attention to pharmacy, chemistry, and natural philosophy, he went to Berlin in 1820, and in 1821 published in the *Isis* a treatise "On the Magnetism of the Voltaic Pile," developing the principles of the application of the multiplicator. From 1824 to 1874, when he resigned, he was editor of the *Annalen der Physik und Chemie*, which became one of the first scientific journals of Germany. In 1834 he was made professor of natural philosophy in the university of Berlin, and in 1838 member of the academy of sciences. He was engaged with Liebig in editing a "Dictionary of Chemistry." He wrote *Biographisch-literarisches Handwörterbuch zur Geschichte der exacten Wissenschaften* (2 vols., Leipsic, 1863).

POGGIO BRACCIOLINI, Giovanni Francesco, an Italian scholar, born at Terra Nuova, near Arezzo, about 1380, died in Florence, Oct. 30, 1459. In 1414 he attended Pope John XXIII. at the council of Constance, as apostolic secretary. In 1416 he engaged in searching the ancient monasteries for manuscripts, and recovered seven orations of Cicero, and a great number of other classical writings. He accompanied Cardinal Beaufort to England, returned to Italy in 1421, became apostolic secretary to Martin V., and served several popes in the same capacity. On the appearance of the plague at Rome in 1450 he withdrew to Florence, where he was chosen chancellor in 1453. His "History of Florence" (translated by his son Jacopo from Latin into Italian) comprises the period from 1350 to 1455. Among his most finished productions is his "Dialogue on Nobility." His works have not yet been properly collected, the Basel edition of 1538 being imperfect. His biography, by the Rev. William Shepherd (Liverpool, 1802), was translated into Italian, German, and French.

POGGY ISLANDS. See Nassau Islands.

POGODIN, Mikhail Petrovitch, a Russian historian, born in Moscow in 1800. He became professor at the university of Moscow in 1833, translated foreign historical works into Russian, edited learned periodicals, and wrote novels, a tragedy, and a dramatized history of the Pseudo-Demetrius. He resigned his professorship about 1844 to devote himself to archæological explorations, and collected relics of Russian and Slavic antiquity, purchased by the government in 1852. His principal work relating to Russian history is *Isledovaniya, zamietchaniya i lektzie* (7 vols., St. Petersburg, 1846–'54). He advocated Panslavism in his famous "Political Letters" (German translation, Berlin, 1860). In 1867 he established a weekly political and literary journal, *Russki.*

POINDEXTER, George, an American politician, born in Louisa co., Va., in 1779, died in Jackson, Miss., Sept. 5, 1853. He began to practise law in Milton, Va., but in 1802 removed to Mississippi territory, where he was commissioned by Gov. Claiborne as attorney general. He was involved in many personal and political quarrels, and from one of these resulted a duel in which he killed Abijah Hunt, then the principal merchant of the southwest. He was territorial delegate to congress from 1807 to 1813, when he was appointed United States judge for his district. After the admission of Mississippi as a state in 1817 he was elected its first representative in congress, where in 1819 he effectively defended Gen. Jackson for his conduct in the Seminole war. From 1819 to 1821 he was governor of Mississippi, and from 1831 to 1835 a member of the United States senate, where he gradually became an opponent of Jackson, and was suspected by him of complicity in the attempt made upon his life at the capitol. In 1835 he removed to Louisville, but soon returned to Mississippi. He published a "Revised Code of the Laws of Mississippi" (1824).

POINSETT, a N. E. county of Arkansas, bordered E. by the St. Francis river and Lake St. Francis, and drained by L'Anguille and several other rivers; area, about 750 sq. m.; pop. in 1870, 1,720, of whom 225 were colored. It has a level surface and fertile soil. The chief productions in 1870 were 36,670 bushels of Indian corn, and 892 bales of cotton. There were 301 horses, 783 cattle, and 3,379 swine. Capital, Harrisburgh.

POINSETT, Joel Roberts, an American statesman, born in Charleston, S. C., March 2, 1779, died in Statesburg, S. C., in December, 1851. He studied medicine and the natural sciences at the university of Edinburgh, and afterward entered the military academy at Woolwich. He returned to Charleston in 1800 and studied law, but in 1801 again went to Europe. Returning in 1809, he was sent by President Madison to South America to ascertain the political condition of the country. On his return he became a member of the South Carolina legislature, and from 1821 to 1825 was a member of congress. In 1822 he visited Mexico in a semi-diplomatic capacity to report upon the condition of the country and the policy of opening diplomatic relations with the emperor Iturbide; and on the accession of Mr. Adams to the presidency he was appointed minister to Mexico. He held the office for 18 months, negotiating during that period a treaty of limits and one of commerce. Returning to Charleston in the midst of the nullification excitement, he became the leader of the Union party. In 1837–'41, under Van Buren's administration, he was secretary of war. He published "Notes on Mexico" (Philadelphia and London, 1824).

POINT COMFORT, Old, a post village and watering place of Elizabeth City co., Va., situated on James river, at the entrance of Hampton roads, 12 m. N. of Norfolk. It is much resorted to in summer for sea bathing, and has commodious hotels. The point is a low, narrow, sandy neck of land, on the extremity of which is Fort Monroe, a formidable structure covering 60 acres of ground. A redoubt thrown forward from its N. W. bastion defends the strip of land which connects the point with the mainland. One mile S. of Fort Monroe, on the other side of the entrance to Hampton roads, an artificial island has been formed upon a mud bank originally covered with 17 ft. of water, and upon the foundation thus obtained an important defensive work, named Fort Wool, is in process of erection. Forts Monroe and Wool close the entrance to Hampton roads, James river, and the water approaches of the navy yard at Norfolk. Fort Monroe is the seat of the artillery school of the United States army, which is a special school of application for both officers and enlisted men. Each of the five regiments of artillery has one battery stationed permanently at the school with its captain, and sends annually to the school four lieutenants. The instruction extends through one year, and comprises the theory and practice of gunnery, military engineering, history, law, mathematics, and tactics. The school was established in 1867 under the command of Brevet Major Gen. W. F. Barry, who is still its commandant (1875).

POINT DE GALLE, a fortified town on a rocky promontory at the S. W. extremity of the island of Ceylon, 65 m. S. S. E. of Colombo; pop. in 1871, 4,954. It is the seat of government of the southern province of the colony of Ceylon; but its chief importance is as the coaling depot and port for transshipping passengers and goods from one line to another, for the steamers that ply between Calcutta, Australia, and Suez, Bombay, Penang, Singapore, and China, with branches to the Dutch and Spanish possessions in the Indian archipelago. The native artisans are celebrated for their skill in making gold and silver ornaments.

POINTE-À-PITRE, a city of the island of Guadeloupe, West Indies, on the S. W. coast of Grande-Terre, at the S. entrance of the river Salée; pop. about 19,000. Its harbor, which is strongly defended, is one of the best and safest in the Antilles. The city is regularly built, and its streets are broad, straight, and well paved. There are three public squares, fine quays, and many handsome buildings, mostly of stone. Pointe-à-Pitre is one of the chief commercial centres of the Antilles, and almost all the trade of the colony is done through it. Its chief exports are sugar, molasses, brandy, cacao, cassia, coffee, cabinet and dye woods, indigo, tortoise shell, preserved fruits, and rum; imports, mostly manufactured goods and provisions. Pointe-à-Pitre was founded in 1768. In 1780 it was nearly destroyed by fire, and in 1843 by an earthquake. In 1871 another disastrous fire burned a large part of the city.

POINTE COUPÉE, a S. E. parish of Louisiana, bordered E. by the Mississippi river and W. by the Atchafalaya; area, 576 sq. m.; pop. in 1870, 12,981, of whom 9,229 were colored. It has a low and level surface, subject to overflow by the Mississippi, and a fertile soil. The chief productions in 1870 were 138,010 bushels of Indian corn, 9,744 bales of cotton, 1,548 hogsheads of sugar, and 113,210 gallons of molasses. There were 612 horses, 1,537 mules and asses, 1,586 milch cows, 1,920 other cattle, 1,257 sheep, and 1,584 swine. Capital, Pointe Coupée.

POINTER (*canis avicularis*), a well known sporting dog belonging to the race of hounds, which it resembles in general aspect, character, and colors. Though frequently called Spanish, and probably introduced by the Phœnicians into western Europe from Spain, the breed is generally believed to have originated in the East. Their habit of standing fixed and pointing to game is the result of a long course of severe training; and, from the succession of generations educated to this purpose, the faculty has become innate to such a degree that young dogs of the pure breed point with scarcely any instruction; good dogs have been known to stand pointing for an hour at a time. When shooting supplanted hawking and coursing, in the latter part of the 17th century, the pointer and other trained dogs took the place of the more powerful, fiercer, and swifter hounds. The hair of the pointer is smooth, sometimes marked like the foxhound's, but generally with more spreading dark colors; and some of the best breed are entirely black. The thoroughbred Spanish pointer has the nostrils separated by a deep groove, and their wings dilated and very sensitive.

Pointer.

POINT LEVI. See Lévis.

POIRSON, Auguste Simon Jean Chrysostome, a French historian, born in Paris, Aug. 20, 1795, died in July, 1871. The college of Charlemagne acquired great importance under his direction from 1837 to 1853, when he retired. His works include *Histoire romaine* (2 vols., Paris, 1827-'8), *Précis de l'histoire de France* (1834-'52), and *Histoire de Henri IV.* (3 vols., 1857; 2d ed., 4 vols., 1862-'7), which received the Gobert prize from the academy.

POISON, any substance which, introduced in small quantities into the animal economy, seriously disturbs or destroys the vital functions. Under this head are obviously included a vast number of bodies belonging to the mineral, vegetable, and animal kingdoms, some solid, others fluid, and others gaseous, and deleterious vapors and miasmata imperceptible to the senses. The science which treats of these is designated toxicology. Until of late years the true nature and effects of poisons were little understood, although poisonous mixtures were much used among the ancient Greeks and Romans. What these preparations were we cannot in all cases ascertain, but some of them can be identified with a considerable degree of probability. (See HEMLOCK.) Among the multitude of substances that rank as poisons are many, some possessing the most active qualities, which are also useful drugs, and which, administered in suitable quantities, are recognized among medicines in universal employment and of the most beneficial character. The difference between a medicine and a poison is frequently a mere question of dose, and the line which divides them is sometimes narrow. Certain poisons manifest their activity chiefly by their effect upon the alimentary canal, and are styled irritants, although they sometimes have also an action upon the constitution of the blood and secondarily upon the solid tissues. Such are the caustic alkalies, mineral acids, oxalic acid, arsenic, corrosive sublimate, to a certain extent tartar emetic, phosphorus, and many vegetables acting as drastic cathartics, such as scammony, croton oil, gamboge, and various other plants of the order *euphorbiaceæ*. Some vegetables when handled, or even by their emanations, give rise to cutaneous eruptions. The manchineel of the West Indies (*hippomane mancinella*) and our native *rhus toxicodendron* and *rhus venenata*, or poison ivy, and poison dogwood, are of this class. The latter are supposed to owe their poisonous properties to the volatile toxicodendric acid. The number of vegetables acting as poisons upon the nervous system, and secondarily upon the heart and other organs, is enormous. They are often called narcotic or narcotico-acrid, although their action is by no means always narcotic or stupefying. Such are opium, belladonna, henbane, savin, tansy, conium, tobacco, lobelia, digitalis, aconite, veratrum, Calabar bean, woorara, nux vomica (containing strychnia), and many others less known. To these may be added alcohol, chloroform, and chloral hydrate. Some volatile poisons appear to act chiefly upon the blood; such are carbonic oxide, illuminating and sewer gas, nitrous oxide, nitro-benzole, and hydrocyanic acid. But the line between this class and the preceding cannot be drawn with accuracy. The action of the poisons of venomous reptiles and insects is less easily understood, from the small quantities usually secreted at a time and obvious difficulties in obtaining it. These poisons are rapidly absorbed from the skin or subcutaneous tissues, but are much less noxious when taken by the mouth, provided no abrasion exists. The same is true of the woorara, curare, or ticunas, the South American arrow poison. The virus or contagions of many diseases, in some instances almost demonstrable, as in smallpox or syphilis, at others hypothetical, as in typhoid, yellow fever, diphtheria, &c., may be with some propriety classed among poisons, and their actions are seen in the symptoms of the special disease developed.—Chronic poisoning may take place from the gradual introduction of small quantities of various deleterious substances. Notable examples are lead poisoning, occurring in lead workers, type founders, painters, and persons using water standing in lead pipes, or liquor contaminated therewith; mercurial poisoning in dry gilders and manufacturers of looking glasses, and from the medicinal use of the drug; arsenical, from green paper hangings, clothing, &c. Chronic poisoning by tartrate of antimony has probably often taken place for criminal purposes. A considerable degree of tolerance may however be observed with certain drugs. Opium may be taken, by persons accustomed to it, in doses enormously larger than would be fatal to a person not habituated to its use. Certain persons in Styria and elsewhere are able to use poisonous doses of arsenic not only with impunity, but, as they allege, with benefit. Stillé's "Medical Jurisprudence" speaks of a case, on the authority of Dr. Hartshorne, where a man was in the habit of taking five grains of corrosive sublimate every day. The number of substances from which accidental or criminal poisoning frequently takes place is smaller than might be supposed from the above statements. In France, during 12 years from 1851 to 1862, 26 substances only were employed, and of these the most common were arsenic, phosphorus, sulphate of copper, verdigris, sulphuric acid, and cantharides. In New York in 1872 deaths by accident and suicide took place from opium and its preparations in 20 cases; Paris green (arsenite of copper) in 24 (all suicides); arsenic, 2; carbolic acid, 2; hydrate of chloral, 2; sulphuric acid, oxalic acid, phosphorus, rat poison (probably phosphorus), colchicum, prussic acid, chloroform, ether, yellow wash, wine, each 1; chronic from lead, 5. In medico-legal cases evidence of poisoning depends on the symptoms and on the discovery of a poison. Symptoms alone can seldom if ever prove conclusively the action of a poison, but organic chemistry has made such progress in recent years that criminal poisoning is much less easily concealed than formerly, and the alkaloid or other active principle which caused death can often be actually exhibited in court. Many alkaloids, however, are fatal in such exceedingly small doses that their separation is a work of very great delicacy, and may even be impossible. In hardly any circumstances is it more important that the so-called expert should be really a competent chemist than in cases of suspected poisoning, and nowhere has an ignorant or careless man a better opportunity to mislead a jury and defeat the ends of justice.—The numerous popular antidotes for snake bites are all alike useless, and thus far science has failed to replace them with any agent deserving the name of antidote. In case of a bite by a venomous serpent, the proper plan is to isolate the part bitten by a ligature, and then if it be a small member, as a finger end, to have it promptly removed, but in any case to take enough of stimulus to carry the weakened heart over the period of depression which belongs to the early stage of venom poisoning. In very grave cases artificial respiration may help to prolong life.—See ANTIDOTES, MEDICAL JURISPRUDENCE, and the articles on the various substances mentioned above.

POISON IVY, or **Poison Oak.** See SUMACH.

POISSON, Siméon Denis, a French mathematician, born at Pithiviers, June 21, 1781, died at Sceaux, near Paris, April 25, 1840. In 1798 he was admitted to the polytechnic school, subsisting upon an income which barely kept him from starving; and in 1800 he was appointed an instructor there. He became professor in 1802, was attached in 1808 to the bureau of longitudes, of which he afterward became president, was chosen professor of mechanics of the faculty of sciences in 1809, member of the institute in 1812, examiner at the polytechnic school in 1816, counsellor of the university in 1820, and a peer of France in 1837. He was principally distinguished for his researches in the theory of definite integrals, and his application of the higher mathematics to mechanics and molecular physics. He was the author of about 300 memoirs on scientific subjects. His most important work is his *Traité de mécanique* (2 vols., Paris, 1811; 2d ed., 1832).

POITEVIN, Auguste, a French sculptor, born at La Fère about 1819, died in 1873. He studied in Paris, and exhibited in 1846 his first important work, representing "The Devotion of Viala." His group of "Judith" appeared in 1849, and was followed by several remarkable busts. For the new Louvre he executed groups symbolical of the fine arts, and for the museum at Amiens two statues representing Greek art and the Renaissance.

POITEVIN, Prosper, a French lexicographer, born about 1810. He studied in Paris, and became a teacher, and for a short time was professor of rhetoric at the collége Rollin. In early life he wrote poetry and plays, but he is best known by his grammars and dictionaries. The most important of his numerous works are: *Nouveau dictionnaire universel de la langue française* (2 vols. 4to, 1854–'60), *Grammaire générale et historique de la langue française* (2 vols. 8vo, 1856), and *Cours pratique de littérature française* (2 vols. 12mo, 1865).

POITIERS, or **Poictiers** (anc. *Lemonum* or *Limonum*, afterward *Pictavi*), a town of France, formerly capital of the province of Poitou, and now of the department of Vienne, 180 m. S. W. of Paris; pop. in 1872, 30,036. It is situated on a rounded eminence on the left bank of the river Clain, at the mouth of the Boivre. The town is enclosed by old turreted walls, pierced by five gates, four of which open on bridges over the Clain. It is the seat of a bishop, and has a cathedral, five parish churches, a castle, an academy, a royal college, several schools and hospitals, a public library, theatre, and botanic garden. Coarse woollen cloths, blankets, hosiery, lace, &c., are manufactured. —The ancient Lemonum was the chief city of the Celtic Pictones. The Visigoths under Alaric were decisively beaten near the town by Clovis in 507; and in October, 732, Abderrahman and his Saracens were defeated a few miles N. E. of it by Charles Martel. By the marriage of Eleanor of Aquitaine to Henry Plantagenet, afterward king of England, Poitiers came into the hands of that prince, and was held by the English until Philip Augustus recovered it in 1204. On Sept. 19, 1356, a few miles from the city, was fought the famous battle of Poitiers, in which John the Good of France, with an army variously stated to be 50,000 and 80,000 strong, was defeated by Edward the Black Prince at the head of 8,000 English and Gascon soldiers. The English were so posted that they could only be approached through a narrow lane, bordered on both sides by very heavy hedges. In these were the English archers, and at the head of the lane were the men-at-arms. The cavalry or knights were held in reserve. The French made an impetuous attack, but the first volley from the archers put them into a confusion from which they did not recover. Being charged by the men-at-arms, they were completely routed, and King John was captured. Poitiers again reverted to France in 1372 by the voluntary surrender of the townsmen to Charles V., the rest of Poitou having previously been conquered. While the English were in possession of the larger part of France, Charles VII. held his court and parliament at Poitiers for 14 years. Numerous councils were held in Poitiers in the middle ages. During the war of the league it was taken from the Huguenots by the Catholics, and Admiral Coligni made an unsuccessful attempt to retake it in 1569.

POITIERS, Diana of. See DIANA.

POITOU, an ancient province in the west of France, bounded N. by Brittany, Anjou, and Touraine, E. by Berry, Marche, and Limousin, S. by Angoumois, Saintonge, and Aunis, and W. by the bay of Biscay. It was divided into Upper Poitou (the eastern half) and Lower Poitou (the western), the capital of the whole being Poitiers. Previous to the conquest of Gaul by Cæsar, it was inhabited by the Pictones or Pictavi; it afterward formed a part of the province of Aquitania, was conquered by the Visigoths early in the 5th century, fell into the hands of Clovis, king of the Franks, in 507, and under his Merovingian successors was held by the dukes of Aquitania. During the reign of Pepin the Short it became part of the Carlovingian empire, and Charlemagne gave it counts of its own in 778. It passed into the hands of the family of Plantagenet by the marriage of Henry II. of England with Eleanor of Aquitaine, was taken from John Lackland in 1204 by Philip Augustus, and was recaptured by the English after the battle of Poitiers in 1356, remaining in their hands till 1369, when Charles V. again subjected it. Before the execution of Louis XVI. the Poitevins rose in insurrection against the convention, and under the name of Vendeans and the leadership of their lords waged a terrible war. (See Vendée.) They were partly subdued by Gen. Hoche in 1795. Attempts to renew civil war took place in 1815, during the hundred days, and after the fall of Charles X. in 1830 and 1832, but failed. Poitou is now dviided chiefly among the departments of Vienne, Deux-Sèvres, and Vendée.

POKANOKETS. See Massachusetts Indians.

POKE, one of the many common names for *phytolacca decandra* (Gr. φυτόν, a plant, and Fr. *lac*, lake, from the color of the berries), which is also called garget, pigeon berry, cocum, scoke, and mechoacan. The genus gives its name to a small apetalous family, the *phytolaccaceæ*, of which it is the only representative in the Atlantic states, where it abounds; it also grows in North Africa, the Azores, China, and the Sandwich islands. It has a large, branched, fleshy root, from which arise numerous herbaceous, branching stems, 6 or 8 ft. high; the pith of the stems, especially late in the season, is curiously arranged in horizontal plates; the large, petioled leaves are alternate; the flowers, borne in long racemes opposite the leaves, have a white calyx of five rounded sepals; 5 to 30 stamens, and a pistil the ovary of which consists of 5 to 12 carpels united in a ring, and which ripens into a flattened, dark-purple berry filled with a crimson juice. The plant is found on the borders of fields and clearings; its roots are very tenacious of life, and it sometimes becomes a weed; it is but little esteemed in this country, but in Europe it is valued as an ornamental plant. All parts of the plant possess active properties; it gets one of its popular names from the use of the root to cure an inflammation of the udder in cows called garget. The old leaves partake of the properties of the root, but the young shoots, as they start in spring, and before the leaves are developed, are by many highly esteemed as a table vegetable, cooked in the same manner as asparagus. The berries yield a remarkably rich crimson juice, but the color is fugitive and has not been fixed. Death has resulted from eating the raw berries, and severe purging has followed from eating the flesh of pigeons which had fed upon them; and though pies have sometimes been made from them, the heat of cooking probably destroying their poisonous qualities, they should be looked upon with suspicion. A tincture of the berries has long been a popular remedy for chronic rheumatism. The root is emetic, acting usually only some time after the dose is administered, and then continuing to act for a long time upon the stomach and bowels. Drowsiness, vertigo, and dimness of vision have been observed after its use, and when large quantities have been taken, great prostration and convulsions. Infusions and ointments made with it have been used externally in cutaneous diseases. Its reputation as a remedy for cancer, which it shares with so many other vegetables, undoubtedly rests on erroneous diagnosis.—Indian poke is a name often given to the American hellebore (*veratrum viride*), which has very different properties. (See Hellebore.)

Poke (Phytolacca decandra).

POKER, a game derived from brag, and first played about 40 years ago in the southwestern United States. At first it was played with 20 cards, all below the tens being thrown out, and the number of players being two, three, or four, who were confined to the cards first dealt. The game thus played, admitting comparatively few complications, never became popular. Subsequently the entire pack was used, cards being drawn from it to improve the game originally dealt to the players. Poker thus modified, and termed "draw poker" to distinguish it from the first "twenty-deck poker," rapidly spread throughout the United States and even to Europe, completely driving out its progenitor, brag. The manner of playing the game is as follows, according to the principles which are now generally accepted by the best authorities. The deal is of no special value, and anybody may begin. The dealer, beginning with the person at his left, throws around five cards to each player, giving one card at a time. He shuffles and makes up the pack himself, or it may be done by the player at his left, and the player at his right must cut. To begin the pool, the player next to the dealer on his left must put up money, which is called an "ante," and then in succession each player, passing around to the left, must, after looking at his hand, determine whether he will "go in" or not; and each person deciding to play for the pool must put in twice the amount of the ante. Those who decline to play throw up their cards, face downward, on the table. When all who wish to play have gone in, the person putting up the ante can either give up all interest in the pool, thus forfeiting the ante, or else can play like the others who have gone in by "making good," that is, putting up in addition to the ante as much more as will make him equal in stake to the rest. Any one at the time of going in must put up as much as double the ante, and may put up as much more as he pleases by way of "raising" the ante, in which case every other player must put up as much as will make his stake equal to such increase, or else abandon what he has already put in. Each player, as he makes good and equals the others who are in before him, can thus increase the ante if he chooses, compelling the others still to come up to that increase or to abandon their share in the pool. All "going in" or "raising" of the pool, as well as all betting afterward, must be in regular order, going round by the left; no one going in, making good, increasing the ante, or betting, except in turn. When all are in equally who intend to play, each player in turn will have the privilege of drawing; that is, of throwing away any number of his five cards and drawing as many others, to try thus to better his hand. The cards thus thrown up must be placed face downward on the table, and, for convenience, in front of or near the next dealer. The dealer, passing around to the left, will ask each player in turn how many cards he will have, and deal him the number asked for from the top of the pack without their being seen. The dealer, if he has gone in to play for the pool, will in like manner help himself last. The players must throw away their discarded cards before taking up or looking at those they draw. When the drawing is all complete, the betting goes around in order, like the drawing, to the left. The ante man is the first to bet unless he has declined to play, and in that case the first to bet is the player nearest to the dealer on his left. But the player entitled to bet first may withhold his bet until the others have bet round to him, which is called "holding the age;" and this, being an advantage, should as a general rule be practised. Each better in turn must put into the pool a sum equal at least to the first bet made; but each may in turn increase the bet or raise it as it comes to him, in which case each player in his turn, proceeding around in order, must make his bet equal to the highest amount put in by any one, or go out of the play, forfeiting his interest in the pool. When a player puts in only as much as has been put in by each player before him, this is called "seeing" the bet. When he puts in a larger amount than any before him, this is called "seeing the bet and going better." When the bet has gone around to the last better or player who remains in, if he does not wish to see and go better, he simply sees and "calls," and then all playing must show their hands, and the highest hand wins the pool. When any one declines to see the bet, or the increase of bet which has been made, he "lays down" his hand, that is, throws it up with the cards face downward on the table. If all the other players throw down their hands, the one who remains in to the last wins, and takes the pool without showing his hand. When a hand is complete, so that the holder of it can play without drawing to better it, it is called a "pat" hand. No one is bound to answer the question how many cards he drew, except the dealer; and the dealer is not bound to tell after the betting has begun.—The following is the relative value of hands in their order, beginning with the best: 1. A sequence flush, which is a sequence of five cards, and all of the same suit. 2. Fours, which is four of the five cards of the same denomination. 3. A full, which is a hand consisting of three cards of the same denomination and two of likewise equal denomination. 4. A flush, which is all five cards of the same suit. 5. A sequence, which is all five cards not of the same suit, but all in sequence. (In computing the value of a sequence, an ace counts either as the highest or lowest card, that is, above a king or below a deuce.) 6. Threes, which is three cards of the same denomination, but the other two of different denominations from each other. 7. Two pairs. 8. One pair. 9. When a hand has neither of the above, the count is by the cards of highest value or denomination. When parties opposed hold each a pair, the highest pair wins, and the same when each party holds threes or fours. When each party holds two pairs, the highest pair of the two determines the relative value of the hands. When each party holds a sequence, the hand commencing with the highest card in sequence wins; so also when two or more parties hold flushes against each other. That full counts highest of which the three cards of the same denomination are highest. The two cards of the same denomination help only to constitute the full, but do not add to the value of the hand. When hands are equal so far that each party holds a pair, or two pairs, of exactly the same value, then the next highest card or cards in each hand must be compared with the next highest card or cards in the other hand to determine which wins. In case of the highest hands (which very seldom occurs) being exactly equal, the pool is divided.

POLA, a fortified seaport of Austria, near the S. extremity of Istria, at the head of a harbor of the same name (Porto di Pola), 54 m. S. of Trieste; pop. in 1869, 10,473, and of the commune formed by it and its suburbs, 16,324. Its bay is one of the most beautiful of the smaller inlets of the Adriatic, and has great advantages as a harbor, which led to its selection in 1850 as a naval station and as the site of an arsenal, dry dock, &c. The town is built on high ground near the water, and is surrounded by a bastioned wall built by the Venetians in the 15th century. With the exception of the cathedral, dating from the 9th century, there are few noteworthy buildings; but there are many remarkably well preserved and beautiful remains of the flourishing colony established here by Augustus, under the name of Pietas Julia. The principal of these are the amphitheatre (restored by the emperor Francis in 1816), the *porta aurea*, a fine triumphal arch, and temples of Augustus and Diana.

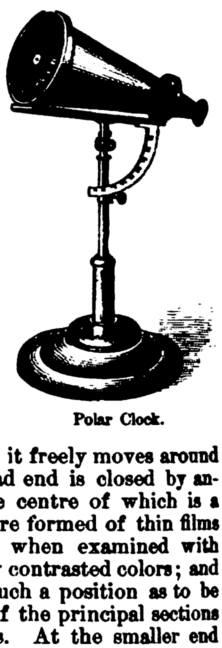
POLAND (Pol. *Polska*), **Kingdom of,** the name of that part of ancient Poland which in 1815 was reconstituted and placed under the sovereignty of Russia. It forms the westernmost portion of the Russian empire, and is situated between lat. 50° 4′ and 55° 6′ N., and lon. 17° 38′ and 24° 15′ E.; area, 49,158 sq. m.; pop. in 1872, 6,225,618. After the unsuccessful insurrection of 1863 Poland lost its independent administration and all its peculiar institutions, and in 1874 its incorporation with Russia was fully completed. It is bounded N. E. and E. by the Russian provinces of Lithuania (the governments of Kovno, Wilna, and Grodno) and Volhynia, S. by Austrian Galicia, and W. and N. W. by the Prussian provinces of Silesia, Posen, and West and East Prussia. All these surrounding provinces, as well as numerous others, were formerly parts of independent Poland, of which the nominal kingdom, or the Vistula country as the Russians call it, is thus but a fragment. This country consists of a quadrangular territory, from the N. E. corner of which a long and narrow tract, bounded by Lithuania and East Prussia, stretches northward. The average length as well as breadth of the quadrangle is about 200 m. By far the greater part of the country is a plain, sinking gently toward the Baltic; only the southern regions are hilly or slightly mountainous, being traversed by the northernmost offshoots of the Carpathians. The Vistula, which flows from that range to the Baltic, enters Poland a little below Cracow, running N. E. along the southern or Galician frontier as far as the mouth of the San, sweeps in a northerly and then northwesterly direction through the middle of the kingdom, and leaves it a little above the Prussian fortress of Thorn. On the right it receives the Wieprz, which rises in the S. E. corner of the country, and the Bug, which rises in Galicia and flows along the E. frontier; on the left the Nida, the Pilica, which rises in the S. W. corner, and the Bzura. The Narew, which rises in Grodno, is a N. affluent of the Bug, which it joins near its mouth. The Niemen, which has its source in Minsk, having traversed Lithuania, reaches Poland near the town of Grodno, and flows along the Lithuanian frontier toward the Baltic. The Warta, the source of which is near that of the Pilica, and its affluent the Prosna, which partly separates Poland from Silesia and Posen, are tributaries of the Oder. Most of these rivers are navigable, and form channels for the exportation of produce through the Prussian towns of Dantzic, Stettin, and Tilsit, to the Baltic. There are lakes in the northern part near the Prussian boundary, but none of large size. The climate is healthy but severe, the summer being very hot and the winter very long and exceedingly cold. In the former season, especially when the S. E. winds blow from the steppes of Russia, the thermometer sometimes rises above 90° F., and in the latter it descends to 15° below zero. The rivers are sometimes ice-bound and the fields covered with snow for four or five months continuously. The soil is mostly a fertile sandy loam; but there are numerous unproductive tracts covered with sand, heath, or swamps. Rich pastures and vast forests abound. The region between the upper Bug and the Vistula is the most fertile, that between the Vistula and the Pilica the most varied and picturesque. The principal products are wheat, rye, barley, oats, buckwheat, and flax; various leguminous plants; apples, excellent cherries, and other fruit. The forest trees include the pine, fir, birch, oak, ash, hazel, and lime; the chief minerals are silver, iron, copper, lead, and zinc. Bees, poultry, sheep, and horses are extensively reared. Of wild animals the most common are the deer, fox, marten, polecat, weasel, and wolf. Among the singing birds are the skylark and the nightingale. The principal fish is the pike.—The bulk of the population consists of Poles (about 4,000,000). The Jews number upward of 800,000, the Ruthenians and Russians about 700,000, and the Lithuanians and Germans about 300,000 each. The Roman Catholic church, to which nearly all the Poles and many Ruthenians, Lithuanians, and Germans belong, had in 1867 one archbishop, seven bishops, and a population of 4,326,473. The convents, which were formerly very numerous, have been mostly suppressed. The number of Protestants was reported as 331,233, most of whom are German Lutherans. The United Greek church had then a bishop at Chelm and a population of 229,250, all Ruthenians. The Orthodox Greek church numbered only 29,932, with an archbishop at Warsaw. In the spring of 1875, however, the bulk of the United Greek population declared its return to the Orthodox church. There were 4,552 Raskolniks, 606 Mohammedans, and 472 pagans.—The main resources of the country are agriculture and mining. Commerce and the trades are to a great extent in the hands of the Jews, and manufactures in those of the Germans. Woollen cloth, cotton goods, flannel, merinoes, shawls, hosiery, leather, paper, glass, beet-root sugar, beer, spirits, iron and zinc, musical instruments, clocks and watches, and carriages are among the principal manufactures, some of which are exported to the various provinces of Russia. Grain, seeds, oil, honey, wool, metals, and timber are exported to the Baltic ports. A strictly guarded customs line protects home manufactures against foreign competition. Railroad lines connect the capital, Warsaw, with St. Petersburg, Moscow, Cracow, Berlin, and Dantzic. The principal manufacturing town is Lodz. The last division of the country is into 10 governments, named after their capitals, viz.: Kalisz, Kielce, Lomza, Lublin, Piotrków, Plock, Radom, Siedlce, Suwalki, and Warsaw.—The Poles form one of the principal branches of the Slavic family of nations. Their ancestors are believed by the best historians to have occupied the same regions during or soon after the time of the great migration of nations. A few centuries later they appear under the name of Polans between the Oder and Vistula, of Lenczycans E. of the Warta, of Masovians between the Vistula and the Narew, and of Kujavians, Kassubs, and Pomeranians on or near the lower Vistula. The Polans, probably so named as inhabitants of the plain (Pol. *pole*, field, plain), formed the most conspicuous group, and eventually gave their name to the whole nation. Their leader or prince Lech is the first among the heroes of legendary Polish history, figuring as the founder of Gnesen; but as Lach is still used for Pole among the Russians, the name of the fabulous brother of Czech and Rus probably belonged to the people. Equally fabulous are, among others, Krakus, the founder of Cracow, and the tyrant Popiel. The election of Piast, a pious and benevolent peasant of Kruszwica, as king, is also regarded as mythical, his son Ziemowit being considered the first historical ruler of Poland (860). Little, however, is known of him, or of his successors before Miecislas I. (962-992), who having married Dombrowka, a Bohemian princess, was induced by her to convert his people to Christianity. He divided his dominions among his sons, but Boleslas, the eldest of them, surnamed the Brave or the Great, made himself master of the whole inheritance, extending it by conquests beyond the Oder, the Carpathians, and the Dniester. He was acknowledged as an independent monarch by the emperor Otho III., but he afterward carried on long wars against Otho's successor Henry II. Dissensions between the successors of Vladimir, grand duke of Kiev, called him to Russia, and he entered that capital in triumph. He was no less successful in peace, promoting commerce, a strict administration of justice, and the spread of the new religion, and strengthening the internal defences of the country. This was still in a comparatively rude condition. Most of the inhabitants were agriculturists bound to do military service; those who were able to equip a horse were regarded as nobles; prisoners of war were held as serfs; and the government was entirely autocratic. Boleslas was fond of splendor, sports, and military displays, and shortly before his death (1025) had himself crowned as king by his bishops. The reign of his son Miecislas II. was short. His widow Rixa, a granddaughter of the emperor Otho II., governed badly for some time in the name of her son Casimir, and anarchy and invasion ensued, but Casimir finally gained the surname of "the Restorer." His son Boleslas II., the Bold (1058-'81), triumphed over the Bohemians, decided by his intervention the disputes about the Hungarian throne, and on a similar expedition to Russia occupied Kiev. On his return from Russia he committed acts of tyranny, and slew St. Stanislas, bishop of Cracow, who had reprimanded him. This roused the people against him, and he died in exile. His brother Ladislas (Wladyslaw) Herman (1081-1102), a weak-minded and sluggish prince, resigned the regal title, being satisfied with that of duke. His son Boleslas III. (1102-'39) warred with success against the Prussians, conquered Pomerania, converting its inhabitants to Christianity, and defended Silesia against the emperor Henry V., but was worsted by the Hungarians, Bohemians, and Russians. By his will he divided his dominions among his four eldest sons; but after long dissensions the crown devolved upon the fifth brother, Casimir II., the Just (1177). He was successful both in peace and war. An assembly of bishops convoked at Lenczyca in 1180 established the rights of the peasants and the clergy. A senate was formed consisting chiefly of bishops, palatines, and castellans, or governors of the fortified castles. Thus the monarchy became limited by the introduction of a kind of oligarchy, which by subsequent changes was developed into an aristocracy. The interests of the lower classes were after the death of Casimir soon disregarded; domains and single estates were granted as presents or rewards to favorites or public officers, with the right of jurisdiction over the peasantry; the obligations of the latter were gradually extended, while the higher nobles were exempted from all public burdens. Of Casimir's two sons, Lesco received the provinces of Cracow, Sandomir, and Pomerania, and Conrad Masovia, Kujavia, Sieradz, and Lenczyca. Lesco was murdered by Sventopelk, a native governor of Pomerania, and that province was lost. Conrad, too, was unable to cope with his heathen Prussian neighbors. He called to his assistance the Teutonic knights, who were not satisfied with the conversion of the half savage people, but made conquest and power their principal object, carried their arms into Lithuania, and soon became terrible enemies of Poland. Under his son Boleslas V. (1227-'79), "an unjust judge, peace-loving knight, and careless ruler," Poland was almost annihilated by the great invasion of the Mongols. The decay of the country was general. The heirs of Conrad subdivided his possessions. Various western districts were pledged for loans or ceded to neighboring German princes, and the Bohemians occupied portions of Silesia. German settlers denationalized parts of their adopted land. German warriors and adventurers flocked to the shores of the Baltic, where the Teutonic knights allied themselves with the knights sword-bearers of Livonia for common crusading wars on the confines of Poland. The Jews, too, who in the time of the crusades were driven by persecution from Germany, retained in Poland the language which they had adopted on the banks of the Rhine and Danube. Tartars, Ruthenians, and Lithuanians made occasional incursions. Ladislas the Short, a grandson of Conrad, succeeded in restoring order and the unity of the larger part of the country (Silesia subjecting itself to the Bohemian kings); made Cracow its permanent capital, where he was solemnly crowned in 1319; reformed judicial abuses; abolished numerous illegally acquired privileges; convened an assembly of senators, chancellors, and other nobles for legislative purposes at Chenciny in 1331, which is regarded as the first Polish diet (*sejm*); and in alliance with the powerful prince of Lithuania, Gedimin, carried on a vigorous war against the Teutonic knights. He urged its continuance in his last advice; but peace was the foremost desire of his son Casimir III., the Great (1333-'70), who made Poland powerful and flourishing. Humane and enlightened above his age, though profligate, he earned the title of "king of the peasants," protected the Jews, had a double code of laws promulgated by the diet of Wislica in 1347, and founded the university of Cracow. But he also took care to strengthen and extend his power. He built cities and fortresses, and after the death without issue of Boleslas of Masovia, who reigned over Halicz (Galicia), annexed his vast possessions to the Polish crown. His death closed the long reign of the Piast dynasty. Casimir's nephew, Louis the Great of Hungary, possessed the title of Polish king, legally conferred by the diet, but hardly deserved it, his policy remaining exclusively Hungarian. His younger daughter Hedvig, a girl distinguished by beauty as well as piety, was acknowledged after his death (1382), and, following the advice of the Polish statesmen, gave her hand to Jagellon or Jagiello, grand duke of Lithuania. This pagan prince was baptized as Ladislas (II.), and promised to convert his people, in which he was assisted by the zeal of Hedvig, and to unite his possessions with Poland. These comprised Lithuania proper, Samogitia (N. of the Niemen), Polesia (on both sides of the Pripetz), Volhynia, Podolia, and Ukraine, and in extent exceeded the territories of Poland, though surpassed by it in population, wealth, and culture. The promised union of the two powerful states was executed gradually and with difficulty. Jagellon (1386-1434) warred successfully against the Teutonic knights, routing them at Grünwald in 1410. After his death, however, his elder son Ladislas III. was acknowledged only in Poland, the Lithuanians preferring to be ruled separately under the younger, Casimir. Both were still under guardianship. Ladislas was subsequently elected king of Hungary, and in a second expedition against the Turks fell in the bloody battle of Varna in 1444. His brother Casimir IV. reigned over both Lithuania and Poland (1444-'92). After several campaigns against the Teutonic knights, he compelled them, in the peace of Thorn (1466), to surrender the territories of Dantzic, Culm, and Ermeland to Poland, keeping the eastern part of Prussia as vassals of that crown. Under him the diets were organized by the introduction of regular representation. Refinement and luxury spread over the country, but the peasantry were more and more oppressed. Three sons of Casimir reigned after him: John Albert, Alexander, and Sigismund I. The last of them was the happiest king of his age (1506-'48). He was beloved by the people and obeyed by the nobility. Poland enjoyed peace, prosperity, and order, while the rest of Europe was distracted by wars. In a war with Muscovy, however, Smolensk was lost. A large part of the Teutonic order having adopted the tenets of Luther, their last grand master Albert of Brandenburg, Sigismund's nephew, was established, as vassal of the latter, duke of eastern Prussia at Königsberg in 1525, the western part of that country, with Dantzic, remaining in the immediate possession of Poland, under the name of Royal Prussia. A peace with the Turks secured the suzerainty of Poland over Moldavia. His son, Sigismund II. Augustus, proved a worthy successor of his father as soon as he was delivered from the pernicious influence of his mother Bona, an Italian princess, who finally withdrew with her rich treasures to her native country. The reform of the republic, as the state was called, now became one of the principal objects of the diets, another being the final union of Lithuania with the crown. To achieve both, the king and the nobles were indefatigable in their endeavors. The Lithuanian lords, however, who gloried in princely titles and enjoyed great feudal privileges, were slow in submitting to the Polish equality of nobles. The union was finally proclaimed by the diet of Lublin in 1569. Ostrogski, Czartoryski, and other powerful Lithuanians signed it. Lithuania ceased to be a hereditary possession of the house of Jagellon, but was to form a common republic with Poland, under the rule of an elective king, with a common diet and senate. The two component parts, however, the grand principality and the crown, maintained their separate titles, armies, finances, and statutes. Podlachia, Volhynia, and Ukraine were transferred from the former to the latter. Livonia, conquered by Sigismund Augustus from the knights sword-bearers, and defended against Ivan the Terrible of Muscovy, remained a common duchy. Warsaw in Masovia was chosen to be the regular seat of the diet. The power, prosperity, and opulence of the state approached their height. Toleration and hospitality attracted foreigners of all sects, Lutherans, Calvinists, and Socinians, while western Europe was the scene of internecine religious strifes. The population of Poland was doubled under the two Sigismunds. With Sigismund Augustus ended the male line of Jagellon (1572). During the interregnum which now followed, the cardinal rights of the nation were established, each elective head being required to enter into a regular covenant with it and to take the oath of fidelity to the *pacta conventa.* He was bound to convoke the diet every two years, to have a permanent council consisting of senators and deputies, to respect the rights of the dissidents, not to declare war or to send ambassadors abroad without the consent of the estates, and not to marry without that of the senate. An infraction of the compact was to absolve the people from allegiance. A diet of convocation, assembled by the archbishop of Gnesen as primate, preceded the diet of election, which was held on the field of Wola before Warsaw, every nobleman having an individual and equal elective vote. The first choice fell upon the most unworthy candidate, the profligate Henry of Valois, duke of Anjou, brother of Charles IX. of France. A splendid embassy escorted the duke from Paris, and a splendid coronation took place at Cracow, in 1574; but the effeminate prince and the hardy nation were soon heartily disgusted with each other; and after a few months, having received the news of the death of Charles, he secretly ran off to France to succeed him as Henry III. The emperor Maximilian II. appeared as candidate; but John Zamojski proposed to give the crown to Anna Jagellon, a sister of Sigismund Augustus, choosing for her husband Stephen Báthori, prince of Transylvania, and his advice prevailed (1575). This Transylvanian was probably the ablest monarch Poland ever had. A zealous Catholic himself, he was animated by a spirit of toleration toward others, and as a patron of science and friend of education founded numerous institutions, among others the university of Wilna, which he intrusted to the Jesuits. He reformed the judiciary, strengthened the military forces of the country, organized the Cossacks of the lower Dnieper as guardians of the S. E. frontier, and in a war against Russia humiliated Ivan and conquered Polotzk. His principal adviser and right arm was Zamojski, who united the dignities of chancellor, castellan of Cracow, and hetman or commander-in-chief. Stephen's reign closed the period of Poland's greatest power and prosperity. The reign of Sigismund Vasa (1587-1632), whose Catholic zeal cost him his hereditary Swedish crown, was distinguished by the achievements of the great commanders Zamojski, Chodkiewicz, and Zolkiewski, in wars with the Swedes, Russians, and Turks, but by no favorable results. In the wars with Charles IX. and Gustavus Adolphus of Sweden Livonia was lost, the Polish fleet on the Baltic destroyed, and a part of Prussia given up by a truce in 1629. In internal affairs Sigismund was not more successful; the Greeks and other dissidents complained, conspired, or rebelled, the regular army extorted its arrears by mutiny, and the royal dignity was more than once humiliated. His son, Ladislas IV. (1632-'48), was successful abroad, but had to submit to further limitations of the regal authority. The dominant class, the turbulent warrior brotherhood, now exercised its sway in every direction, tyrannically guiding the king, prohibiting superior titles, entirely excluding the non-nobles from all legislative influence, and more and more burdening and degrading the peasantry. Similar oppression, as well as religious persecution, was now begun against the Cossacks, which at the time of Ladislas's death resulted in a dreadful rising under Chmielnicki, who, after a desolating war, finally subjected the rebellious warriors to the czar of Moscow. This war and defection was only one of the calamities which befell the brother and successor of Ladislas, the religious and brave but fickle John (II.) Casimir (1648-'68). The chief sources of misfortune were legislative anarchy, culminating in the *liberum veto,* or the right of a single deputy to prevent or annul the action of the diet, internal dissensions, and the readiness of neighboring powers to profit by them, which made John Casimir prophetically predict in the diet the future dismemberment of the country by Brandenburg, Austria, and Russia. In his own reign, simultaneously assaulted by the Russians and Cossacks, Charles Gustavus of Sweden and his ally the great elector of Brandenburg, and George Rákóczy of Transylvania, Poland was on the brink of ruin; Warsaw, Cracow, Wilna, and Lemberg all fell into the hands of enemies; the king was deserted, and fled to Silesia. But a confederation for defence was formed by the Potockis and other patriots; heroic efforts were made, John Casimir returned, the king of Denmark proved a useful ally, and Czarniecki was victorious against all enemies. Peace was conquered, but at great sacrifices. Ducal Prussia was definitely ceded to Brandenburg, almost all Livonia to Sweden, and Smolensk, Severia, Tchernigov, and Ukraine E. of the Dnieper to Russia. Poland was half a desert. John Casimir, despairing of the future, resigned. Michael Korybut Wisniowiecki was elected his successor, and almost compelled to accept the crown. The hetman (commander-in-chief) John Sobieski, who had routed the Moslems at Khotin (1673), was elected on his death. Wars with the Turks filled his reign. In 1683 he delivered Vienna and filled Christendom with the fame of Polish arms, but obtained no benefit for his own country. Equally fruitless were his later undertakings, and he died little beloved by his people in 1696. His sons found no support at the election; the diet was divided, and two foreigners, the prince of Conti and the elector of Saxony, Augustus (II.), were elected by the opposing factions. The elector arrived before Conti, and prevailed. His alliance with Peter the Great of Russia and Frederick IV. of Denmark, against the young Charles XII. of Sweden, proved a source of calamities to himself and the country. The Saxons fought Augustus's battles, and the Poles, who had not been consulted about the war, were little inclined to aid him. Charles after the battle of Narva easily overran Lithuania and Poland, and occupied Warsaw and Cracow; but he preferred giving away the crown of Poland to taking it himself, and had his friend, the youthful Stanislas Leszczynski, substituted for the voluptuous Saxon (1705). But scarcely had he lost the battle of Poltava (1709) when Augustus returned, and with the help of the Russians recovered the regal crown. Stanislas joined his protector in Turkey. The following period of peace was one of public and private corruption. The nobility was infected by the effeminacy of the court, and abandoned the defence of constitutional rights; religious fanaticism legalized the long exercised exclusion of the dissidents from office; and Russian interference became permanent. A Russian army helped a faction of the nobles to establish the son of Augustus as his successor in 1733, instead of the reëlected Leszczynski. Louis XV. of France, who had married the daughter of Stanislas, commenced a war of Polish succession on the Rhine, at the termination of which the latter received Lorraine, but Augustus III. remained on the throne of Poland. During the seven years' war Russian armies crossed and recrossed the country without opposition. Constitutional anarchy made legislation almost impossible. But already the more enlightened of the nation began to think of vital reforms. To transform the republic of the nobles into a regular constitutional kingdom became the scheme of the Czartoryskis and their friends. In order to conquer the opposition of Radziwill, the Potockis, and other adherents of the old republican constitution, they secretly sought the aid of Catharine II. of Russia, who readily but treacherously granted it. After the death of Augustus III. in 1763, Stanislas Augustus Poniatowski, a favorite of the empress and nephew of the Czartoryskis, was illegally placed upon the throne by a confederation of the reformers, aided by Russian bayonets. The regal prerogative was somewhat enlarged. But Poniatowski was feeble to fickleness, and allowed himself to be used as a tool by the designing empress. Her ambassador Repnin, who had an army at his disposal, became the real ruler. He encouraged the dissidents and enemies of reform, who formed numerous small confederations, united them into one at Radom, and by force of arms compelled them to accept the guarantee of the unlimited republican liberty by Russia. The patriots, however, took up arms. The confederation of Bar took the lead (1768), its soul being the Pulaskis, especially Casimir, and Krasinski, bishop of Kamenetz. The struggle against the Russians, the Porte too declaring war against them, was carried on long and fiercely in various parts of the country, but only by a part of the nobles. Meanwhile Catharine concerted a division of Poland with Frederick the Great and Maria Theresa. The Prussians and Austrians entered Poland in 1772; the confederates, already greatly weakened, dispersed, and the dismemberment of the country began. A diet was convoked in 1773 to sanction the deed; but few of the members appeared, and these remained silent. Russia took the palatinates of Polotzk, Vitebsk, and Mstislav, and some adjoining parts; Prussia, the Polish province of that name, with the exception of the towns of Thorn and Dantzic, and a part of Great Poland on the Netze; Austria, Red Russia and some adjoining districts, uniting them under the names of Galicia and Lodomeria. The old constitution with all its abuses was fastened upon the remaining territories of Poland, under the guarantee of Russia. To save and strengthen the country by reforms now became a general tendency. A new constitution, framed by the double diet of 1788-'92, promulgated May 3, 1791, and most solemnly adopted by the king and the people, abolished the *liberum veto*, gave political rights to the cities and civil rights to the peasantry, and made the throne hereditary, offering the succession to the elector of Saxony. Frederick William II. of Prussia encouraged the reformers, and offered his aid against Russia. But the aid of Catharine II. was invoked by the defenders of the old constitution, who, under the lead of Felix Potocki, Francis Xavier Branicki, and Severin Rzewuski, in 1792 formed the confederation of Targovitza against the new order of things. The Russians entered Poland; the Polish army, commanded by Joseph Poniatowski, the nephew of the king, retreated to the Bug; the arrival of the king in person was waited for in vain; Prussia proved traitorous, and Kosciuszko's splendid fight at Dubienka (July 17) was useless. After long wavering, the king virtually ended the struggle by going over to the confederation; the Russians occupied the capital, and a diet convened by the victors at Grodno in 1793 was compelled at the point of the bayonet to sanction a new division of the country. The ostensible defender of the old "republican liberty," Catharine, with her own hand drew a line on a map across Lithuania and Volhynia, taking all the land E. of it; the late ally of Poland, Frederick William, secured himself against "Polish Jacobinism" by taking the remainder of Great Poland and the towns of Thorn and Dantzic. The despair of the nation broke out in a great insurrection in 1794, for which Madalinski gave the signal. Kosciuszko was called from abroad to lead it as dictator, and, appearing at Cracow, hastily armed the people of the vicinity, partly with pikes and scythes, and routed the Russians at Raclawice (April 4). Warsaw and Lithuania rose; a supreme council was formed; the king was ignored. But the means of the exhausted country were scanty; arms and unanimity were wanting, and the Russians were soon joined by Prussian and Austrian armies. Kosciuszko was defeated at Szczekociny and Zajonczek at Chelm. Warsaw, besieged by Frederick William in person, was saved by a rising in the rear of the Prussians; but Kosciuszko was overwhelmed by Suvaroff and Fersen at Maciejowice (Oct. 10), and taken prisoner. The storming and massacre of Praga and the capitulation of Warsaw (Nov. 8) followed; the Polish troops were disbanded; most of the commanders were dragged into captivity; and Poniatowski resigned his crown at Grodno in 1795. The third division annihilated the existence of Poland, effacing even its name. Russia took all the provinces E. of the Niemen and Bug; Austria those between the latter river, the Pilica, and the Vistula; Prussia all the remainder, with the capital. But the surviving patriots immediately commenced making new endeavors for the restoration of their country. Oginski and others invoked the help of France, Turkey, and Sweden, and Dombrowski succeeded in forming in Italy Polish legions for the army of Napoleon, which, after ten years' service abroad, victoriously reëntered their native land. By the treaty of Tilsit (1807) Napoleon transformed the greater part of the Prussian share of Poland into a duchy of Warsaw, which received a tolerably liberal constitution, and a ruler in the person of the king (formerly elector) of Saxony, Frederick Augustus. This little Polish state made immense exertions in behalf of its French ally and protector on many theatres of war, but especially in the great Russian campaign of 1812, which promised the restoration of the whole of Poland. This hope soon vanished, and the duchy itself was destroyed in 1813, after a gallant resistance. The territorial limits of divided Poland were now rearranged by the congress of Vienna, which, while creating a shadow of Polish independence in the miniature republic of Cracow, naturally gave the lion's share to Alexander of Russia. The czar formed his new acquisitions, extending from the Niemen and Bug to the Prosna, into the so-called kingdom of Poland, to which he gave a constitutional form of government, a separate responsible ministry, and a national army of 50,000 men. Of this separated and privileged part of his vast Polish possessions the czar was the king, and his brother Constantine, its military governor and generalissimo, the virtual viceroy, Gen. Zajonczek being the nominal one. But the harmony between the foreign rulers and the people could be but superficial, and it was but of brief duration. Mutual distrust prevailed from the beginning; the opposition to the government gained strength from diet to diet; violations of the constitution and attempts at conspiracy grew frequent; Constantine tortured the army by excessive drilling, and alienated its best officers by insults; and after the accession of Nicholas (1825) an open rupture became imminent. Nevertheless the outbreak at Warsaw, precipitated by a small band of youthful democratic conspirators under Peter Wysocki, which drove Constantine and his Russians in the night of Nov. 29–30, 1830, from that capital, took both the emperor and the nation by surprise. The whole people immediately declared in favor of the revolution, but the aristocrats took the lead with the intention of moderating its course. To this party belonged Prince Adam Czartoryski, president of the provisional government; the old poet Niemcewicz; Chlopicki, for a short time dictator; his successors in the chief command of the army, Radziwill, Skrzynecki, Dembinski, and Malachowski; and the generals Dwernicki, Chrzanowski, Bem, Uminski, Rybinski, and Prondzynski. The agitations of Lelewel, Mochnacki, and other democrats, had no other result but an increase of difficulties. Much precious time was wasted in attempted negotiations, the army increased slowly, and a powerful Russian army under Diebitsch was allowed to cross the Bug without resistance. The independence of Poland and the exclusion of the house of Romanoff having been declared (Jan. 25, 1831), a series of bloody battles was fought near Warsaw, especially at Dobre, Wawer, and Grochów, in February and March, and on the middle Narew and Bug and at Ostrolenka in May, in which the Polish commanders displayed great courage but little generalship. Dwernicki, sent to revolutionize Volhynia, had been compelled to retire into Galicia, and there to surrender to the Austrians; another corps, sent under Gielgud and Chlapowski to the assistance of the Samogitian and Lithuanian insurgents, shared the same fate on Prussian territory in July, Dembinski alone saving his detachment by an admirable retreat; the main army remained inactive around the capital, allowing the new Russian commander-in-chief Paskevitch to cross the lower Vistula on the Prussian frontier, and to advance toward Warsaw on the left bank of that river. The people growing impatient, Skrzynecki was deposed, presumed traitors were massacred in a night of horrors (Aug. 15), and Krukowiecki succeeded Czartoryski as president of the government. Ramorino having been sent to the southeast with a part of the Polish army, Paskevitch finally attacked the fortified capital, and after a murderous struggle, during which Krukowiecki negotiated, a capitulation virtually ended the war (Sept. 8). The main army under

Rybinski laid down its arms on Prussian territory, Ramorino in Galicia, a corps under Rozycki at Cracow, and Zamosc and Modlin surrendered. Depopulated at once by the sword and by the cholera, the country lay bleeding and exhausted at the feet of the czar, and mercy was neither expected nor exercised. Numberless patriots were sent to Siberia, the private soldiers compelled to serve in the Russian army, the estates of refugees confiscated, the constitution and the laws of the country abrogated, the university of Warsaw and other principal schools abolished, rigorous censorship of the press and a terrible police system introduced, and a citadel at Warsaw and other new fortifications erected. This system was continued throughout the reign of Nicholas, though at times moderated by the milder disposition of the governor, Paskevitch. A similar though less rigorous policy was pursued in all other Polish provinces, the republic of Cracow alone preserving its national character. In the mean while the Polish emigrants, residing mostly in France, though split into violently opposing factions, were unremitting in endeavors for the restoration of their country. The more ardent or adventurous took part in various revolutionary movements in western Europe, and fomented conspiracies in Poland. The most extensive of the latter led to simultaneous outbreaks in Russian Poland, Galicia, Cracow, and Posen in February and March, 1846. All of them ended disastrously. The leaders in Poland were hanged, those in Posen, Mieroslawski and others, imprisoned, and the patriotic nobles of Galicia butchered by the peasants; the republic of Cracow, where alone the insurrection was for a short time successful, was abolished and annexed to Galicia. Mieroslawski and his associates, being saved from death by the revolution of Berlin in March, 1848, fought soon after, with hastily collected Polish bands, bravely but unsuccessfully, against overwhelming Prussian forces in Posen; Bem, Dembinski, and Joseph Wysocki commanded Hungarian armies and Polish volunteers against Austrians and Russians in 1848–'9; Czajkowski and others fought against the latter in the eastern war of 1858–'6; but all these efforts directly or indirectly to benefit Poland from abroad remained fruitless. Considerable ameliorations took place in the Russian Polish provinces after the accession of Alexander II. (1855), numerous refugees returned, and new reforms were hoped for, when increasing agitation and popular demonstrations at Warsaw in February and April, 1861, induced the new governor, Gortchakoff, to employ the military force, and many lives were sacrificed. Similar collisions took place in other parts of the country. Simultaneously a Polish diet was convened at Lemberg (April 15), Austria having been compelled by its reverses in Italy (1859) to inaugurate a liberal policy. (See AUSTRIA, and GALICIA.) In the kingdom of Poland the moderate lead assumed by the agronomical society, under Count Zamojski, came to a speedy end. Several generals succeeded Gortchakoff, among them Lüders, and force was rigorously employed. A great national gathering on the Bug was prevented by bayonets, and demonstrations in the churches of Warsaw led to wholesale imprisonments and transportations to Siberia (October, 1861). Lenient views, however, still prevailed in the councils of Alexander II., and in June his brother Constantine was appointed viceroy of Poland, and the marquis Wielopolski, a Pole of liberal Panslavic tendencies, attached to him as chief of the civil administration. Reforms in favor of the peasantry and the Jews were initiated. But the national spirit could no longer be satisfied with moderate grants. A wild revolutionary enthusiasm had taken hold of a portion of the youth. Attempts at assassination were made against Lüders, Constantine, and Wielopolski. Secret committees organized a baneful terrorism. To crush this revolutionary movement by one blow, the government determined upon a conscription on a grand scale, of which, according to secret instructions, the mass of the patriotic youth were to be the victims. It was partially executed in the middle of January, 1863, by surprise in the night time. This precipitated an insurrection. Thousands of young men fled to the forests, and the secret central committee at Warsaw on Jan. 22 called the nation to arms, and proclaimed a series of democratic reforms. The nobility and clergy eagerly joined in the movement, but the peasantry, though enfranchised by the revolutionary decrees and made exclusive proprietors of the soil which they held, showed little patriotic zeal. Poland and Lithuania were flooded with Russian troops, and the insurgents were unable to organize armies. A furious guerilla warfare was waged in all parts of Russian Poland, and Posen and Galicia sent aid in men, arms, and money. The attempts of Mieroslawski and Langiewicz, in February and March, to establish a military dictatorship, were baffled by reverses, and the Warsaw central committee henceforward secretly directed the operations, organizing a net of sub-committees, which collected taxes, enforced obedience, and punished traitors to the cause, often by assassination, under the very eyes of the Russian authorities. But the insurgent forces remained scattered, no town of importance was occupied, and the friendly powers, France, Austria, and England, though protesting in diplomatic notes against the failure of Russia to fulfil its promises of 1815, stopped short of active interference, while Prussia proved hostile. Wielopolski retired in July, and Constantine was succeeded in August by Gen. Berg, whose military rigor was surpassed only by that of Gen. Muravieff in Wilna. In Lithuania the insurrection was crushed in autumn, and in Poland in the following winter and spring, the secret Polish government, consisting of bold and reckless persons of little note, disappearing early in 1864. Tens of thousands had perished, and equally numerous were the victims of transportation to Siberia, execution, incarceration, and confiscation. The peasantry, however, were left to enjoy the fruits of enfranchisement. Lithuania, Volhynia, and Podolia were violently Russianized, the separate features of the administration in the kingdom of Poland systematically abolished, this country being divided into ten new governments (1867), and placed under the administrative senate at St. Petersburg (1868), the university of Warsaw and the other schools Russianized (1869), and the Russian calendar (O. S.) introduced (1870).—Among the principal works on the history of Poland are, in Polish, those of Naruszewicz, Niemcewicz, Bandtke, Lelewel, and Szajnocha; and in other languages, those of Oginski, Rulhière, Salvandy, Brzozowski, Roepell, Mieroslawski, L. Chodzko, and Caro.

POLAND, Language and Literature of. The Polish language belongs to the northwestern group of the Slavic division of the Indo-European tongues. Its principal dialects, though not materially differing from each other, are those of Masovia, Little Poland and Galicia, Lithuania, and Great Poland, besides the more degenerate Silesian. The alphabet consists of the following letters: *a* (short Italian *a*), *ą* (French *on*), *b*, *b́* (soft, combining *b* and *y* consonant), *c* (*tz*), *ć* (*tch*, very soft), *cz* (*tch*), *ch* (*kh*, Ger. *ch*), *d*, *e* (short Italian), *é* (compressed, as in *yes*), *ę* (Fr. *in*), *f*, *g* (hard), *h*, *i* (short Italian), *j* (*y* consonant), *k*, *ł* (*l*, very hard), *l* (It. *gl* as in *gli*), *m*, *n*, *ń* (Fr. *gn*), *o* (short Italian), *ó* (compressed, approaching *u*), *p*, *ṕ* (soft, *b* and *y* consonant), *r*, *rz* (*rzh*, Fr. *rj* in one), *s*, *ś* (*sh*, very soft), *sz* (*sh*), *t*, *u* (short Italian), *w* (*v*), *x*, *y* (resembling the Ger. *ü*), *z*, *ż* (*zh*, Fr. *j*), *ź* (*sh*, very soft). *I* serves to soften various consonants, replacing the ′; *drób́*, little poultry, gen. *drobiu*; *żyć*, to live, *zycie*, life; *koń*, horse, gen. *konia*; *wieś*, village, gen. *wsi*. The accent, except in foreign words and in compounds, is constantly on the penultimate: *rōdak*, countryman, gen. *rodāka*, dat. *rodakōwi*. As in Latin, there is no article: *cnota*, virtue, a virtue, the virtue. There are seven cases of declension: nominative, genitive, dative, accusative, vocative, instrumental (*mieczem*, by or with the sword), and locative (after certain prepositions, as *w Bogu*, in God). The forms of declension depend upon the termination, the gender, and the kind, words of the same termination denoting persons, animals, and lifeless objects having in the masculine severally different forms. The gender of nouns is mostly determined by the termination. There are three genders for nouns, adjectives, pronouns, verbs, and participles, as: *Mój dobry kochany ojciec dał*, My good beloved father gave; *Moja dobra kochana matka* (mother) *dala*; *Moje dobre kochane dziecko* (child) *dało*. The following may serve as examples of the declension of nouns and adjectives in the masculine and feminine singular: *wielki las*, (a, the) large forest, *wielkiego lasu*, *wielkiemu lasowi*, *wielki las*, *wielki lesie!*, *wielkim lasem*, (*w*) *wielkim lesie*; *wielka rzeka*, (a, the) large river, *wielkiej rzeki*, *wielkiej rzece*, *wielką rzekę*, *wielka rzeko!*, *wielką rzeką*, (*w*) *wielkiej rzece*. The comparative degree is formed by the syllable *szy* (nom. mas. sing.), the superlative by *naj* and *szy*, thus: *stary*, old, *starszy*, older, *najstarszy*, oldest; *mocny*, strong, *mocniejszy*, *najmocniejszy*. The numerals are as follows: *jeden* (Sans. *eka*; compare also the Heb. *e' had* and the Hung. *egy*), *dwa* (Sans. *dvi*, Gr. *δύο*, Lat. *duo*), *trzy* (Sans. *tri*, Gr. *τρεῖς*, Lat. *tres*), *cztery* (Sans. *tchatur*, Lat. *quatuor*), *pięć* (Sans. *pantchan*, Gr. *πέντε*), *szesć* (Sans. *shash*, Lat. *sex*), *siedm* (Sans. *saptan*, Lat. *septem*), *ośm* (Sans. *ashṭan*), *dziewięć*, *dziesięć* (Sans. *daç'an*, Lat. *decem*), *sto* (Sans. *ç'ata*, Lat. *centum*), *tysiąc* (*thousand*). The verb is exceedingly rich in forms, which serve to express frequency, intensity, inception, duration, and other modes of action or being. The formatives consist chiefly of prepositions and other particles, as in German, thus: *znać*, to know, Ger. *kennen*; *poznać*, to recognize, Ger. *erkennen*; *rwać*, to tear, *wyrwać*, to snatch, Ger. *entreissen*; *rozerwać*, to tear asunder, Ger. *zerreissen*; *rozrywać*, long or frequently to tear asunder; *porozrywać*, to tear asunder to the last. *Ć* marks the infinitive, *ł* the past: *znam*, I know, *znać*, to know, *znalem*, I knew; the persons are distinguished by the termination: *znam*, I know, *znasz*, thou knowest, *zna* (he, she, it) knows, *znamy*, *znacie*, *znają*, we, you, they know. Diminutives, denominatives, and other derivatives are abundant. Compounds are rare. The words of a sentence can be arranged almost as freely as in Latin, misunderstanding being precluded by the distinctness of the formative terminations. In flexibility, richness, power, and harmony the Polish is hardly excelled by any other language of Europe; its grammatical structure is fully developed and firmly established, its orthography precise and perfect. The principal grammars are by Kopczynski, Mrongovius, Bandtke, Mrozinski, Poplinski, and Muczkowski (Cracow, 1845); the principal dictionaries by Linde, Bandtke, Mrongovius (Kōnigsberg, 1835), and Trojanski (Posen, 1835–'46).—The oldest remnants of Polish literature consist of proverbs, popular songs and tales, and a religious song in praise of the Virgin (*Boga rodzica*) attributed to St. Adalbert (Wojciech), who lived in the time of the first Christian monarch of Poland, toward the close of the 10th century. The Latinizing influence of Christianity, and of the universities of western Europe, which were generally frequented by the Poles, prevented the development of a national literature in Poland during the middle ages; and all the literary productions of that period, as well as the laws of the country, were written in Latin. Among the most important of the former are the chronicles of Martin Gallus (about 1130), Kadlubek (1220), Boguphalus (1250), and Martin Skrzenbski, surnamed Polonus (1270), and the celebrated "History of Poland" by Dlugosz (1480). The principal centre of scholarship and science was the university of Cracow, the first foundation of which was laid by Casimir the Great (1347), and which among its teachers and alumni counted some of the most distinguished scholars of Europe, among others Copernicus, whom Poland claims as its son and citizen. The first Polish printing press was established at Cracow toward the close of the reign of Casimir IV. (1490). Among its earliest productions is the great collection of Polish laws by the chancellor of King Alexander, John Laski (1506). In the succeeding reigns of Sigismund I. and his son Sigismund Augustus, the last two of the Jagellons (1506–'72), Polish literature was first and rapidly developed, the 16th century being regarded by many as its golden age. The poetical style especially rose to an astonishing degree of perfection. The satirist Rej (born in 1515), and John Kochanowski, the great lyrical poet (1532–'84), are both called the fathers of Polish poetry. Of the two younger brothers of the latter, Peter translated Tasso's "Jerusalem Delivered," and Andrew Virgil's Æneid. The poets Szarzynski, Rybinski, Klonowicz, Miaskowski, and Grochowski were contemporaries of the Kochanowskis. The reformation, which found an easy spread in Poland, produced numerous translations of the Bible into the national language, for Lutherans and Socinians as well as for Catholics. Among the theologians of that age the great Catholic pulpit orator Skarga (died 1612) and the Protestant author Niemojewski deserve particular mention. Martin and his son Joachim Bielski, in the latter part of the 16th century, wrote a *Kronika polska*, Górnicki *Dzieje w koronie polskiej* ("History of the Polish Crown Lands"), Stryjkowski (died 1582) a "Chronicle of Lithuania," and Paprocki (died in 1614) works on heraldry. Others wrote in Latin: Orzechowski the *Annales Poloniæ;* Kromer, archbishop of Ermeland (died in 1589), *De Origine et Rebus Gestis Polonorum.* Szymonowicz (Simonides), an author of celebrated Latin odes, and of equally excellent Polish idyls (*Sielanki*), and Zimorowicz, his rival in the latter species of composition, flourished during the reign of Sigismund III. (1587-1632); but in the second half of that reign Polish literature began rapidly to decline, Latin being the principal object and medium of instruction. The disastrous wars and civil strifes of that and the following reigns of the Vasa dynasty exercised a pernicious influence. Sobieski restored only the glory of Polish arms, and the succeeding Saxon rule inaugurated a period of general relaxation. During a century and a quarter pedantry, bad taste, and impurity of language prevailed. Of the better poets of that epoch may be mentioned the Jesuit Sarbiewski (Sarbievius, died in 1640), who wrote in Latin only, and earned the title of the Sarmatian Horace; Opalinski, a writer of satires (died in 1655); Twardowski (died in 1660); Kochowski, who accompanied John Sobieski to Vienna, and in the epic *Wiedeń wyzwolony* ("Vienna Delivered") sang the glory of his hero; Bardzinski; Morsztyn, the translator of Corneille; and Elizabeth Druzbacka (1687–1760), whose *Pochwała lasów* ("Praise of the Woods"), *Cztery pory roku* ("The Four Seasons of the Year"), &c., appear as the precursors of a better literary age. The historians wrote mostly in Latin: Piasecki (1585–1649) a liberal history of his times (*Chronicon Gestorum in Europa*); Starowolski (died in 1656), among other works, a *Status Regni Poloniæ Descriptio;* Kojalowicz (died in 1677) an excellent *Historia Lithuaniæ;* Andrew Wengierski (died in 1649) and Lubieniecki (died in 1675) histories of the Reformed church in Poland. Among those who contributed most to the introduction of a better era were the brothers Joseph and Andrew Zaluski; the former, who was bishop of Kiev (died in 1774), especially by the collection of a library of more than 200,000 volumes. More powerful still was the influence of the great reformer of public education, the Piarist Konarski (died in 1773). The courts of the exiled king Leszcynski in Lorraine, and of Poniatowski in Warsaw, as well as the residences of the princes Czartoryski and Jablonowski, were centres around which the representatives of reform in politics, social life, education, literature, and science grouped themselves. The politically unhappy reign of Poniatowski, the last king of independent Poland, thus became in a literary point of view the most distinguished. Piramowicz wrote for schools; Bohomolec translated French dramas; Trembecki, Kniaznin, and Wengierski composed fine lyrical or descriptive poems; Naruszewicz a great "History of Poland" and an admirable translation of Tacitus; and Krasicki miscellaneous works in verse and prose, by which he merited the distinction of being called the Voltaire of Poland. This purified literary activity survived the divisions and fall of Poland. The poets Godebski, Wenzyk, author of *Okolice Krakowa* ("The Environs of Cracow"), and Dmóchowski, the dramatists Felinski, Krópinski, Osinski, and Boguslawski, and the eminent historical or political writers Czacki, Albertrandy, Kollontaj, Stanislas Potocki, Ossolinski, and Staszyc, belong principally to the beginning of the present century. The most popular poets of the next following period were Karpinski, Brodzinski, Woronicz, and especially Niemcewicz, who was also distinguished as a historian, and in his ballads (*Śpiewy historyczne*) surpassed all his predecessors. He was, however, soon afterward himself eclipsed in epic poetry by Mickiewicz, the founder of the romantic school of Polish poetry, around whom numerous young disciples grouped themselves at Wilna. To the romantic school belong most of the more recent poets of Poland, many of whom wrote, after the revolution of 1831, in exile; the Ukrainians Malczewski, author of the admirable epic "Maria," Goszczynski, Zaleski, and Padura; Odyniec, author of the drama of *Izora;* Korsak, who wrote elegiac poetry and lyrics; Alexander Chodzko, translator of Persian and other oriental poetry; Gorecki, Siemienski, Garczynski, Bielowski, Julius Slowacki, Groza, Krasinski, Zaleski, and numerous others. Novels were published in the earlier part of this century by Niemcewicz, Maria Czartoryska, Bernatowicz, and Skarbek, and more recently by Grabowski, Czajkowski, Zielinski, Kaczkowski, and especially Kraszewski. Dramas have been written by Skarbek, Kaminski, Fredro, Magnuszewski, Korzeniowski, and others; the best historical works by Bandtke, Lelewel, Maciejowski, Narbutt, Eduard Raczynski, Plater, Szajnocha, and Lukaszewicz; the most popular educational works by Clementina Tanska-Hoffmann; and philosophical works by Sniadecki, Trentowski, and Libelt. The most important works on Polish literature are by Mochnacki, Muczkowski, Bentkowski, Ossolinski, Chodynicki, Wiszniewski (*Historya literatury polskiej*, 7 vols., Cracow, 1840–'46), and Lukaszewicz (Posen, 1860).—The centres of Polish literary activity, and especially of periodical literature, are Warsaw, Wilna, Posen, Cracow, Lemberg, and Paris, the latter city as the principal seat of the Polish emigration. Warsaw, however, in spite of very severe restrictions on the press, has always maintained a decided preëminence over all its rivals, as the literary metropolis of Poland.

POLAR CIRCLES, two small circles or parallels of latitude, situated so that the arc of a meridian included between each of them and the nearest pole of the earth measures the angle of inclination of the earth's axis to the ecliptic. This angle is about 23° 28′, and the polar circles are therefore in about 66° 32′ N. and S. latitude respectively. The northern is called the Arctic, the southern the Antarctic circle. According to the common division of geographers, the former is the boundary between the north frigid and the north temperate. the latter between the south frigid and the south temperate zones. They are also generally considered as the respective boundaries of the Arctic and Antarctic oceans. The portions of the earth enclosed by the polar circles are the only regions in which the day or the night is ever more than 24 hours long. On the circles themselves the greatest length of day (or of night in its alternation) is almost exactly 24 hours, and the length increases as the poles are approached until the six-months day or night of the pole itself is reached. The regions within the Arctic circle have been in some degree explored (see Arctic Discovery, and Polar Seas), while those within the Antarctic circle are almost unknown. (See Antarctic Discovery.)

POLAR CLOCK, an instrument invented by Sir Charles Wheatstone for showing the time of day by means of the polarized light of the sky. By referring to the subject of polarization in the article Light, it will be seen that if a beam of light is passed through a polariscope, and a plate of selenite or other double-refracting crystal is interposed between the polarizer and the analyzer to produce interference and colorization, and the analyzer is rotated, the color will change into every grade of tint and pass into the complementary color. The effects will be the same whether the light is polarized by one piece of apparatus, or by reflection from various objects lying in the direction of the axis of the analyzer. As the light of the sky is polarized in a direction at right angles to the rays of the sun, it follows that if a Nicol's prism, serving as an analyzer, is placed with its axis parallel to the earth's axis and revolved so as to change its position with respect to the plane of polarization, the phenomena of change of intensity of light and color will be produced, as it also will if the apparatus is stationary while the sun revolves about it. The polar clock, constructed upon this principle, is described as follows by the inventor: "At the extremity of a vertical pillar is fixed, within a brass ring, a glass disk, so inclined that its plane is perpendicular to the polar axis of the earth. On the lower half of this disk is a graduated semicircle divided into 12 parts, and against the divisions the hours of the day are marked, commencing and terminating with VI. Within the fixed brass ring containing the glass dial plate, the broad end of a conical tube is so fitted that it freely moves around its own axis; this broad end is closed by another glass disk, in the centre of which is a small star or other figure formed of thin films of selenite, exhibiting, when examined with polarized light, strongly contrasted colors; and a hand is pointed in such a position as to be a prolongation of one of the principal sections of the crystalline films. At the smaller end of the conical tube a Nicol's prism is fixed so that either of its diagonals shall be 45° from the principal section of the selenite films. The instrument being so fixed that the axis of the conical tube shall coincide with the polar axis of the earth, and the eye of the observer being placed to the Nicol's prism, it will be remarked that the selenite star will in general be richly colored; but as the tube is turned on its axis the colors will vary in intensity, and in two positions will entirely disappear. In one of these positions a smaller circular disk in the centre of the star will be of a certain color, while in the other position it will exhibit the com-

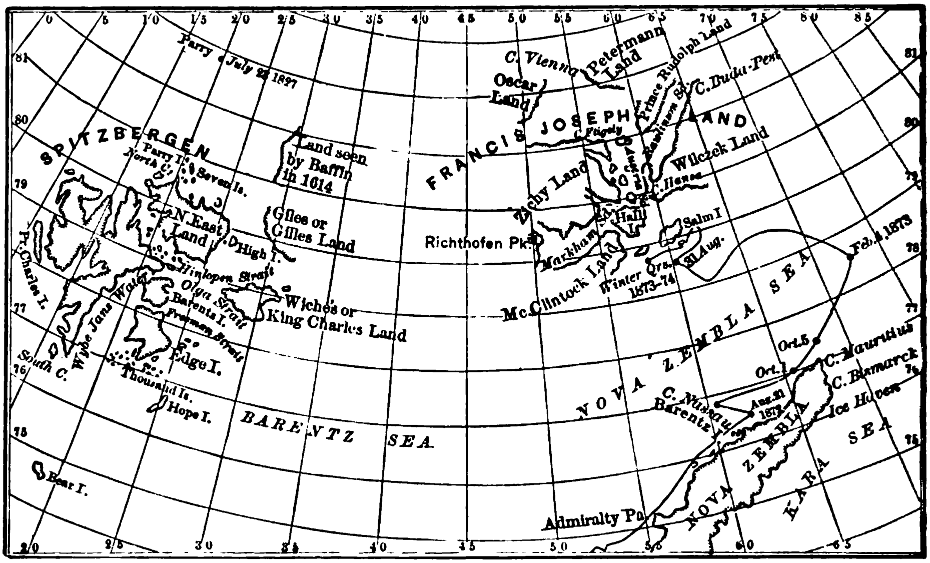


Polar Clock.

plementary color. This effect is obtained by placing the principal section of the small central disk 22½° from that of the other films of selenite which form the star. The rule to ascertain the time by this instrument is as follows: the tube must be turned round by the hand of the observer until the color of the star entirely disappears, while the disk in the centre remains red; the hand will then point exactly to the hour. The accuracy with which the solar time may be indicated by this means will depend on the exactness with which the plane of polarization can be determined; one degree of change in the plane corresponds with four minutes of solar time." "The advantages a polar clock possesses over a sun dial are: 1. The polar clock being constantly directed to the same point of the sky, there is no locality in which it cannot be employed; whereas in order that the indications of a sun dial should be observed during the whole day, no obstacle must exist at any time between the dial and the places of the sun, and therefore it cannot be applied in any confined situation. The polar clock is consequently applicable in places where the sun dial would be of no avail; on the north side of a mountain or of a lofty building, for instance. 2. It will continue to indicate the time after sunset and before sunrise; in fact, so long as any portion of the rays of the sun is reflected from the atmosphere. 3. It will also indicate the time, but with less accuracy, when the sky is overcast, if the clouds do not exceed a certain density. The plane of polarization of the north pole of the sky moves in the same direction as that of the hands of a watch; it is more convenient, therefore, to have the hour graduated on the lower semicircle, for the figures will then be read in their direct order, whereas they would be read backward on an upper semicircle. In the southern hemisphere the upper semicircle should be employed, for the plane of polarization of the south pole of the sky changes in the same direction as the hands of a watch. If both upper and lower semicircles be graduated, the same instrument will serve equally well for both hemispheres." The inventor devised several forms of the instrument, but the one given in the engraving illustrates the principle.

POLARIZATION. See Light, vol. x., p. 445.

POLAR SEAS, the waters surrounding the north and south poles. I. Arctic Ocean. This is properly only the termination of the Atlantic, and is bounded by the northern coasts of America, Europe, and Asia. The Arctic circle includes nearly the whole basin with the exception of some of the border seas, such as Hudson bay and a part of the White sea. It communicates with the Pacific through Behring strait, and with the Atlantic through Davis strait, besides its wide connection between Greenland and Norway. (See Arctic Discovery.) In its known parts islands are numerous and some of them are large. N. of America they form an archipelago; N. of Europe are Spitzbergen, the newly discovered Francis Joseph Land, and Nova Zembla; N. of Asia the New Siberian islands and the imperfectly known Wrangell Land. There are probably more in the unexplored central region, as land has been seen to the northward of the furthest points reached by the American and Austrian expeditions; but the absence of icebergs from the drift ice N. of Spitzbergen indicates the absence in that direction of land extensive enough to support glaciers. There are border seas and bays of considerable size, forming dependencies of the Arctic ocean, such as the White sea, the Kara sea, the gulf of Obi, Hudson bay, and Baffin bay. The drainage of N. E. Europe, the whole of N. Asia, and a large portion of North America is poured into the arctic basin by rivers of considerable size and length.—The unexplored part of this sea is about as large as the continent of Australia; as the ice is the only impediment to navigation in it, a knowledge of its different stages and of the names they have received is of importance. Icebergs are the largest masses, which on account of the slowness of their melting descend furthest toward the equator. They are all formed on land in the shape of glaciers. (See Glacier.) Of these the largest have been observed in Greenland, where they cover a great part of the interior, and abut on the sea either by arms descending into the bays or fiords, or by a bold front many miles in extent, as in the Humboldt glacier in Smith sound. If the glacier terminates on a cliff fronting the sea, large masses of ice gradually overhang and finally break off by their own weight; but if the shore is low and the end of the glacier dips into the sea, it will push its front part forward until it reaches water deep enough to float the mass, which is then broken off by the force of buoyancy. The process of breaking off has been called by the whalers "calving." The icebergs are then carried away by the current, and by irregular melting are made to assume the most fanciful forms. Being originally formed by snow, the ice is perfectly fresh, and it is often melted down by navigators to renew their water supply. The sea water freezes in winter to the depth of 6 to 10 ft., and when it breaks up it forms ice fields, often many miles in extent. Smaller ice fields are called floes. By collision the edges of fields and floes become broken and piled up into hummocks. Fields and floes much broken up, partly open and partly refrozen, are called the pack. Drift ice and brash ice are parts of the pack scattered and in motion, the latter term being used when the pieces are much reduced. A margin of ice which adheres to the shores and is formed by the tides is called the ice belt or ice foot. Navigators can judge of the extent of ice beyond the horizon by a peculiar glistening of the atmosphere known as the ice blink; over open water the sky looks dark and is known as water sky.—The nearest approaches to the pole have been made N. of Spitzbergen by Parry, through Smith sound by Kane, Hayes, and Hall, and to the east of Spitzbergen by the Austrian expedition under Payer and Weyprecht. The distances from the pole reached through these three routes do not differ materially, being all between 400 and 500 nautical miles. In these parts the ice breaks up in summer and moves S., thus opening irregular channels through which it is possible to penetrate more or less easily, according to the season. The question of an open polar sea has received much attention of late years; it was first advocated by the Russian explorers, Wrangell, Middendorff, and others, who had observed a band of open water N. of the New Siberian islands, to which they gave the name of Polynia. This is probably due to a current of warmer water passing from the Atlantic toward Behring strait. The American expeditions found open water at the N. end of Kennedy channel, and the tides have been supposed to indicate a free communication with the Pacific in the direction of Behring strait; but this is very doubtful, as in all known instances the tide wave is promptly extinguished after passing through a narrow strait into a wide basin. Börgen, in discussing the results of the second German expedition, calculates that, supposing the whole polar sea to be frozen over in winter, about one third of the ice is carried off in summer by drifting and melting; but he thinks that the uncovered surface consists of irregular and constantly changing openings in the ice, not necessarily communicating with one another. The question will only be fully solved by actual exploration.—The currents are very important, as determining the limits of the drift ice. The different theories on the subject of the northern extension of the Gulf stream are set forth in the article Atlantic Ocean. Its observed effects are briefly these: The warm water, crossing the Atlantic diagonally, passes the North cape and strikes the western and northern parts of Nova Zembla, where it occasionally leaves proofs of its origin in the shape of bamboos and tropical seeds. Further E. observations are still wanting, but it is probable that the open water, the Polynia of the Russians, is still due to the same cause. A return current from E. to W. has been observed by the Austrians along the S. coast of Francis Joseph Land, which probably merges in the cold current descending along the E. coast of Spitzbergen. On the W. of that island a warmer current sets N. The S. and E. coasts of Iceland also receive warm water from the south. Along the E. coast of Greenland a cold current sets S. and turns around Cape Farewell into Davis strait, which it follows up some distance, finally turning and merging in the Labrador current, which flows S. on the opposite side of the strait, and which after passing the banks of Newfoundland partly disappears under the Gulf stream and partly flows S. along the coast of the United States. A cold current flows out of Behring strait into the sea of the same name. In conformity with the temperature of these currents, the Arctic ocean is found almost free of ice along the N. coast of Europe as far as the northern part of Nova Zembla and the Kara sea. On the E. coast of Spitzbergen it is so thick as to be generally impenetrable; on the W. coast it is very loose, or even absent, in summer. Along the E. coast of Greenland the pack is so thick that ships can rarely reach the land, though some



navigators suppose that further N. it forms only a barrier in summer, with comparatively open water beyond. In Davis strait drift ice and icebergs are very abundant on the Labrador side, and are carried in spring and summer over the banks of Newfoundland, sometimes as far S. as lat. 40°. The Behring strait current carries ice as far as the Aleutian islands. Although water communication is known to exist through the various channels in the North American archipelago, they are so obstructed by ice that no vessel has yet penetrated from sea to sea through the famous northwest passage; the ice, though in motion, becomes gorged in the narrower parts. —Temperature observations show that in winter there are two poles or regions of greatest cold, the one among the islands north of America, the other in northern Siberia. The milder region between the two, about the earth's pole, would thus appear to be chiefly occupied by water. In summer this middle part is the coolest, on account of the greater accumulation of ice and the greater absorption of the sun's heat by the land. Wherever observations have been made in winter, calm days have been found to exceed in number the windy days, and to be accompanied by clear weather and greater cold. Wind from any quarter raised the temperature and brought clouds and snow. To the traveller the impression is the reverse, as a greater degree of cold is more endurable in a calm than a lesser when the air is in motion.—The arctic lands and seas support a considerable number of animals, which furnish man with food, clothing, and fuel. On land the reindeer, the arctic fox, the arctic hare, and the lemming are found in the northern parts of all the continents and adjacent islands, and even on islands so isolated as Spitzbergen. The musk ox is confined to the American polar regions, including Greenland. The polar bear, although found also on land, is more generally found on the ice where he can capture the seal, his ordinary prey. Of the latter several species are found, and together with the walrus form the object of a lucrative pursuit, expeditions being fitted out in Newfoundland and the ports of northern Europe. Numerous cetaceans inhabit the water, of which the narwhal is the most peculiar. The right whale was formerly found in great abundance in the Greenland seas and inside of Behring strait, but indiscriminate persecution has reduced the number so that its pursuit has almost ceased to be profitable. Aquatic birds frequent the polar seas in summer in immense numbers, for the purpose of breeding. Fish is found everywhere, but not of a size or in quantities sufficient to be an article of commerce; of late, however, Norwegian fishermen have paid some attention to and derived profit from the capture of the arctic shark off the N. E. coast of Lapland and near Bear island. The lower animals, crustaceans, mollusks, and radiates, are represented by fewer species than in warmer seas, but in compensation the number of individuals is very large, and even in great depths the dredge finds undiminished numbers.—*Recent Explorations.* The scientific and exploring expeditions which from time to time have been made into the Arctic ocean are traced to a late period in the article ARCTIC DISCOVERY, and in the biographies of the various explorers there referred to. That article brings the history of arctic exploration down to the unfortunate expedition of the American Captain Hall (1871-'3), described in still further detail in the article HALL, CHARLES FRANCIS. The history of arctic exploration since that expedition will be briefly given here. The year 1872 began with several minor expeditions, generally undertaken at private cost, and each contributing, though in minor matters only, to a knowledge of the best paths to be pursued in more important undertakings. They were nearly all carried out by seamen of northern Europe. Thus in the early summer Capt. Altmann, a Swede, sailed his yacht, the Elvine Dorothea, along the entire E. coast of Spitzbergen, found the sea free from ice, and visited Wiche's Land or King Charles Land. Capt. Nils Johnsen (of Tromsö), in the Lydiana, and Capt. Johannes Nilsen, in the Freia, also landed in this long unvisited region in the summer of 1872. All these, by their reports of the freedom of the passage from ice, contributed to the growing opinion in favor of an eastern path to more northern latitudes. Dr. Leigh Smith, an English savant, spent a part of the summer in scientific investigation of the seas N. of Europe, and Capt. David Gray cruised for some time off the E. coast of Greenland. Later in the year the Norwegians Capt. Jensen and Svend Foyn, the latter a well known whaler, undertook expeditions, but without noteworthy result. The Norwegian government also sent out a winter expedition to Spitzbergen, hoping to relieve 17 Norwegian sailors who were known to be cut off there by the ice; but the vessel was driven back by the severity of the weather. A private expedition followed, with like result. On Jan. 28, 1873, Herr Rosenthal of Bremerhaven, well known for his efforts in this direction (see ARCTIC DISCOVERY, vol. i., p. 680), sent out a steamer for Spitzbergen with the same object, but, like the Norwegians, without success. In June, 1873, when the island was reached by Capts. Tellefsen and Mack, the 17 men were found to have died of starvation.—While these minor expeditions were in progress, a party had been organized in Sweden to spend the winter on Spitzbergen, in order to begin from that point a sledge expedition toward the pole. The steamers Polhem and Onkel Adam, and the brig Gladan, with Prof. Nordenskjöld, the leader of the expedition, Capt. Palander, Drs. Erwall and Wijkander, and others, and a large crew, arrived at Green Harbor, on the W. coast of Spitzbergen, Aug. 4, 1872. Being unable to carry out the original plan of establishing winter quarters on Parry island, further N., the expedition established itself at Mussel bay, lat. 79° 50′ N. It had been intended that the Gladan and Onkel Adam should return at once to Sweden, leaving but 21 men in all for the winter; but before they could make their escape all three vessels were shut in the ice, and 67 men found themselves left with provisions and other necessaries for only 21. Another misfortune followed. Their reindeer, brought to draw the sledges northward, escaped from their keepers, and thus the objects of the expedition were rendered impossible. After successfully withstanding the severity of the winter, by dint of great care and prudence in the use of their provisions, the explorers found themselves compelled to abandon their project, and returned in the summer of 1873.—Payer and Weyprecht, the very successful Austrian arctic explorers (see ARCTIC DISCOVERY, vol. i., p. 680), after returning from their journey of 1871, had undertaken, with the aid of liberal subscriptions and appropriations, to make a further exploration. According to their instructions they were simply to visit the seas N. of Siberia, and thoroughly explore them. As it turned out, they were led to widely different results. A vessel, the Tegetthoff, was built especially for the expedition, and fitted with every appliance which experience could suggest. The final arrangements were made at Tromsö, and the expedition sailed thence on July 14, 1872. Count Wilczek, an influential Austrian, one of the chief supporters of the plan, in the yacht Isbjörn, started a little earlier toward Spitzbergen to establish a provision depot; and after reaching that island and going to Nova Zembla, he joined the Tegetthoff, which had pursued a more direct course, on Aug. 12. On the 21st, however, the Isbjörn took leave of her more important companion, and returned to the south. For more than a year nothing was heard of the Tegetthoff, and great anxiety prevailed throughout Europe as to her fate. Directions were given to northward-bound whalers to search for her; and a relief expedition had been proposed in Russia, when suddenly, on Sept. 3, 1874, the party of the Tegetthoff were brought safely into Wardö, Norway, by the Russian schooner Nikolai. On the very day of her parting from the Isbjörn the Tegetthoff had been caught in the ice (only temporarily, as her crew then supposed) N. W. of Cape Nassau, in lat. 76° 30′ N. Every effort to set her free proved vain. The ice closed round her in a solid mass, which no storms sufficed to break up, and the pressure forced her up upon the floe and nearly destroyed her hull. This continued during the whole winter, and the position of the ship varied as the winds and currents moved the ice field; but the direction of this was generally northward, and into regions which the expedition might not have reached by other means. On Aug. 31, 1873, they saw high land to the northward, and their observations soon revealed to them an island or continent hitherto unknown. Late in October they landed upon it in lat. 79° 54′ N., between lon. 55° and 60° E., at a point which they called Wilczek island. The whole body was named Francis Joseph Land, after the Austrian emperor, and in the arctic night which succeeded they explored it for some distance inland. On the reappearance of daylight, Feb. 24, 1874, Payer undertook three sledge journeys, in the second of which he reached a little beyond the 82d parallel of latitude. The new region, so far as explored, consisted of a wild and mountainous country, with peaks more than 2,500 ft. high, several of which Payer ascended, and with enormous and picturesque glaciers, the whole nearly surrounding an extensive sound (Austria sound), dotted with islands. The E. coast of this was named Wilczek Land, the W. coast Zichy Land, and the region at the head of the sound Crown Prince Rudolph Land. The furthest point attained by him, lat. 82° 5′ N., Payer called Cape Fligely; he reached it on April 12, and saw from it another sound still further N., and other mountains about it. A far-off promontory of this mountainous shore, which was plainly visible, was named Cape Vienna, and the furthest land to be seen was called, in gratitude to the great German geographer, Petermann Land. The third sledge journey was toward the west, and during it Payer saw the highest peak discovered, Mt. Richthofen, about 5,000 ft. high. After the return from this journey, the party abandoned the Tegetthoff and journeyed to the south for 96 days by sledges and boats, over the ice and water. On Aug. 18, 1874, after much suffering, they sighted the Admiralty peninsula of Nova Zembla, and six days later discovered the Russian schooner Nikolai, by which they were at once taken up and carried to Wardö. From this point to Vienna they were everywhere greeted with great rejoicings. This expedition is the most important of those undertaken in the last decade. Its results had a great effect upon the discussion of the problem of reaching the pole, and upon the question of an open polar sea, and everywhere directed the attention of scientific men and governments again to arctic discovery.—Shortly after Payer and Weyprecht's return, a new expedition was resolved upon by the British government. Two ships were placed in the dockyards to be fitted up for the explorers, and Capt. Nares of the British navy, who commanded the scientific cruise of the Challenger, was assigned to their command. The Alert and the Discovery (formerly the Bloodhound) were the vessels selected, and the expedition sailed on May 29, 1875. The following brief abstract of the instructions has been published: The Alert and the Discovery are to push up Smith sound as far as practicable during the coming season. The Discovery is to find winter quarters somewhere within Smith sound, and at such a distance from the entrance that it may be within reach of a third ship, which is to sail in 1877 if necessary, and form a depot somewhere near the mouth of the sound. The Alert is, if possible, to push on to some point further N., but not to winter at a greater distance than 200 m. from her consort. In the spring of 1876 the sledging expedition for the north pole will be sent out, and subsidiary expeditions be made for the exploration of the coast. Success in the spring of 1876 might enable the expedition to return in the course of that autumn; but a second winter, and even another season of exploration, may become necessary. If it should appear impossible to extricate the ships from the ice in the summer of 1877, one or both would probably be abandoned, and the crews would fall back upon the relief ship to be sent out to the entrance of Smith sound.—For an excellent and detailed account of polar exploration since 1871, see *Die Polarforschung der Gegenwart*, by Friedrich von Hellwald, in the *Deutsche Rundschau* for November, 1874. II. ANTARCTIC OCEAN. The royal geographical society has fixed the limits of the Antarctic ocean arbitrarily at the south polar circle, which corresponds nearly with the average limit of the pack ice. Other limits based on isothermal conditions of the sea have been proposed, but observations are not yet sufficient in number to give satisfactory results. Much less is known of this sea than of the north polar sea, the totally unexplored regions in the two bearing the proportion of nearly three to one. Navigators who have penetrated into the ice are few, and the highest point reached by Sir James C. Ross falls far short of the latitude reached by many of the northern expeditions. (See ANTARCTIC DISCOVERY.) Our older maps showed in this region an imaginary antarctic continent, which the progress of discovery has tended to diminish continually; we are still much in the dark with regard to the extent of the land seen, and much acrimonious discussion has taken place between the American, English, and French discoverers. The discrepancies could probably be reconciled in a great measure by assuming that much of the land seen consisted of islands of no great extent, which have been erroneously assumed to be parts of a continuous coast. Victoria Land, discovered by Ross, is probably the largest island actually seen; mountains of 12,000 to 15,000 ft. were seen on it, the southernmost being the volcanoes Erebus and Terror. The ice pack is encountered between lat. 60° and 70°, and was supposed by Capt. Cook, who first saw it, to be impenetrable. But his successors since the time of Bellingshausen have found that during the southern summer it is in motion toward the north, and that after penetrating it large spaces of open water are found, at times so extensive that no ice is in sight from the masthead. Capt. Ross, after penetrating to lat. 78° 10′, was stopped by a high barrier of apparently stationary ice. From all accounts, the antarctic ice seems to be much heavier and thicker than that at the north pole, but of its mode of formation we know but little. Immense fields are described with a flat surface, but terminated by vertical cliffs, generally about 150 ft. high, quite different from anything observed at the north. The ice drifts to the north further in the southern summer than in winter. According to Fitz Roy, who has collected a large number of observations of drift ice, it is found in greatest abundance and further toward the equator in January than in any other month. The average limits for the whole year within which drift ice and bergs are encountered with tolerable certainty are 45° S. in the middle and E. part of the Atlantic and the W. part of the Indian ocean, 54° in the middle part of the Pacific, 58° off Cape Horn, and 60° in the central part of the Indian ocean and W. part of the Pacific, or between the meridians of 70° E. and 170° W. With regard to quantity, it appears that it is least in the seas S. of Australia and New Zealand, and greatest in the eastern Atlantic and western Indian ocean; but this result may be affected by the greater number of observations on record for the latter region. The extreme lowest latitudes at which drift ice has been encountered are 34° S. in the Atlantic and 40° in the Pacific. The influence of ocean currents is very plainly exhibited in the outline of the limits of drift ice. Thus at the S. extremity of America the Cape Horn current, joined to the Brazilian and La Plata currents, repels the ice toward the east, keeping it off the Falkland islands; but east of these the antarctic current carries it far into the Atlantic. At the cape of Good Hope the ice is carried into a point toward its W. end by the same current which here gives off the South African current. But immediately E. of the cape the united Mozambique and Madagascar warm currents repel the ice considerably further S. Again, S. of Australia and New Zealand the combined S. and E. Australian currents form a deep bend in the limiting line of the drift ice. Deep-sea temperatures were taken by Sir James C. Ross, but with thermometers exposed to pressure and therefore not as trustworthy as the more recent though less numerous ones of the Challenger expedition, which gave 28° to 29° at the surface (32° near the pack), 29° at a depth of 40 to 300 fathoms, and below that 33° to 34°. This warmer stratum prevented the obtaining of the true temperature at the bottom. With regard to the climate, observations, deficient as they are, still point conclusively to the fact that the winters are milder and the summers cooler than in the north polar regions, thus indicating a more maritime climate caused by a less amount of land. No land mammals are known to inhabit the islands of the far south, thus contrasting with the north polar regions, where large and numerous animals have been observed almost as far north as man has penetrated. But the sea is inhabited by numerous seals and cetaceans, and birds, particularly penguins, have been found in astonishing numbers. Fishes and lower animals must of course abound correspondingly.

POLE, Reginald, an English cardinal, born at Stowerton castle, Staffordshire, in 1500, died Nov. 18, 1558. On his mother's side he was related to Henry VIII. He was sent when seven years old to the Carthusian monastery of Shene, near Richmond in Surrey, and graduated at Magdalen college, Oxford, in 1515. In 1517 he became prebendary of Salisbury, and in 1519 dean of Wimborne and Exeter. About 1520 he went to Padua to finish his studies. Returning to England in 1525, he was received with great favor by the king; but preferring to spend his time in study, he retired to Shene. He had been here about two years when Henry began to question the legality of his marriage with Catharine of Aragon; and Pole, foreseeing trouble, obtained from the king permission to visit Paris. Returning after a year, his retirement was again disturbed by the determination of the king to throw off the pope's supremacy, and his desire to gain the approbation of his relative. As Pole refused his consent, to avoid the anger of Henry he passed over to the continent and dwelt successively at Avignon, Padua, and Venice. Meanwhile Henry had married Anne Boleyn, and caused a defence of his title of head of the English church to be written by Dr. Sampson, bishop of Chichester. This was sent to Pole, who wrote in reply *Pro Unitate Ecclesiastica*, in which he compared the king to Nebuchadnezzar. Henry discontinued Pole's pension, deprived him of his preferments, and caused an act of attainder to be passed against him. Paul III., who was then pope, created him a cardinal, and sent him as nuncio to France and Flanders, and afterward as legate to Viterbo. Here he remained until the opening of the council of Trent, which he attended as a papal legate, and in which he is said to have maintained the doctrine of justification by faith. Although suspected on this account of a leaning toward Protestantism, he was nevertheless employed by Paul in the affairs of the papal court, and on the death of that pontiff came near being chosen his successor. On the accession of Pope Julius III., he retired to the convent of Maguzano near Verona, and there remained until called to England by Queen Mary. He was made archbishop of Canterbury after the burning of Cranmer, and was elected chancellor of Oxford and subsequently of Cambridge. In the cruel measures which were taken at that time for the extirpation of Protestantism, it has been a matter of debate how far the primate was censurable; but the weight of evidence seems to favor the conclusion that he was inclined rather to lenient than to harsh proceedings. He died 16 hours after the death of the queen. His life was written by T. Phillips (2 vols., 1764).

POLECAT (*putorius communis*, Cuv.), a well known animal of the weasel family, spread over Europe and temperate Asia. It is about 15 in. long, the tail 6 in. additional, and 6 or 7 in. high; the general color is dark brown, fading into yellowish below, the legs and tail black, and the face whitish with a brown mask across the region of the eyes; the colors vary considerably. The form is elongated, the head short and rounded, the teeth the same as in the ferret, the feet five-toed with sharp claws, the mammæ four and ventral, and the fur soft and thick. It is very active, pursuing living prey upon the ground, and rarely ascending trees; it is very sanguinary, but its size limits its depredations to small animals, such as domestic fowls, ground birds, squirrels, rabbits, and other rodents; it is strictly nocturnal, remaining concealed during the day in some outbuilding, as it generally lives in the neighborhood of man, and committing its havoc at night in the hen roost and dove cot; it is so wary as generally to escape traps. When alarmed or irritated, it emits a very disagreeable odor in the secretion of the anal glands, which attaches itself even to the fur, preventing that use of it to which its fineness entitles it. The female generally makes her nest in a rabbit burrow, having killed or driven away the rabbit. Its habits and manner of killing its prey are the same as in the ferret. The common fur called fitch is that of the polecat, one of whose popular names is fitchet.

Polecat (Putorius communis).

POLEMO. **I.** A Greek philosopher, born in Athens about 340 B. C., died about 273. In his youth he gave himself up to sensuality; but becoming a disciple of Xenocrates, he went to the other extreme of rigid and austere temperance. He succeeded to the chair of Xenocrates, and was the teacher of Arcesilas, Crates, and Zeno. **II.** A Greek geographer of the early part of the 2d century B. C. He wrote a "Voyage round the World," from Pontus to Carthage, and polemical works against Timæus and Eratosthenes. An edition of his fragments by Preller was published at Leipsic in 1838. **III.** A king of Pontus, died after A. D. 2. He was originally of Caria or Phrygia, and was the son of Zeno the rhetorician. He obtained his kingdom from Mark Antony, whom he served efficiently in the war against Parthia. He was made prisoner, but obtained his liberty when the civil war broke out between Octavius and Antony, and immediately marched to the assistance of the latter. After the battle of Actium Polemo was reconciled to Octavius, who confirmed him in his sovereignty, and added to his realm all the territory upon the Cimmerian Bosporus. In a war against the Aspurgians, a barbarian tribe, he was made prisoner and put to death. **IV.** Son of the preceding, after whose death he assisted his mother Pythodoris in the administration. On her death (A. D. 39) he was recognized by Caligula. Three years later the emperor Claudius ceded Cilicia to him in exchange for the kingdom of the Bosporus, which was given to a descendant of Mithridates. Polemo II. embraced Judaism in order to espouse Berenice, afterward famous for her amour with Titus; but that princess having left him, he returned to his former faith. He abdicated during the reign of Nero.

POLEVOI, Nicolai Alexeyevitch, a Russian author, born in Irkutsk, Siberia, July 4, 1796, died in St. Petersburg, March 6, 1846. He was the son of a manufacturer and brandy distiller, was educated at home, and at a very early age wrote plays. He read enormously, and was known in his native town as "the wonderful boy." In 1811 he was sent to Moscow, his father following to establish his business there; but in 1812 they left that city at the French invasion. For some years afterward Polevoi passed his time in mercantile expeditions between St. Petersburg, Irkutsk, and Kursk; but in 1825 he returned to Moscow and established a newspaper called the "Moscow Telegraph," which inaugurated a new era in Russian literary criticism, but was suppressed in 1834 on account of its liberal tendencies. In 1838 he went to St. Petersburg, where he spent the remainder of his life. His incessant literary labor gradually broke down his constitution, while the rapidity with which he produced his works diminished his reputation. The best of his dramas are "Parasha, the Siberian Girl," the "Grandfather of the Russian Fleet," and a translation of "Hamlet." He wrote "Sketches of Russian Literature," the "Life of Suvaroff," the "Life of Peter the Great," a "Life of the Emperor Napoleon" (which extended to the burning of Moscow, and was completed by the author's brother), a "History of the Russian People," and a "Century of Russia," a historical account from 1745 to 1845.—His brother, XENOPHON ALEXEYEVITCH, after being for many years a bookseller at Moscow, removed to St. Petersburg. He is the author of a novel entitled "Michael Vasilevitch Lomonosoff" (2 vols., Moscow, 1836), and other works. His sister, KATARINA ALEXEYEVNA AVDEYEFF (1789-1865), was a well known authoress. PETR, the son of Nicolai, an author residing at St. Petersburg, became known by his biography of Shakespeare contained in the Russian translation of his complete works by Nekrasoff and Gerbel (4 vols., St. Petersburg, 1866-'7).

POLI, Giuseppe Saverio, an Italian naturalist, born in Molfetta, Oct. 24, 1746, died in Naples, April 7, 1825. He entered the army, and was appointed by Ferdinand I. in 1776 professor of military geography at Naples, became a fellow of the royal society of England while on a tour of inspection of the military schools of Europe, and on his return was appointed professor of experimental philosophy and director of the military academy at Naples. He was distinguished as a comparative anatomist and physiologist, but particularly for his knowledge of the character and habits of testacean mollusks. He published *Testacea Utriusque Siciliæ* (2 vols. fol., Parma, 1792-'5; vol. iii., 1826). He discovered many new genera and species, and the nervous system of the testacea, though he mistook its nature.

POLIANTHES. See TUBEROSE.

POLICE (Gr. πολιτεία, government), a civil force organized in connection with the judicial and executive system of a state or city, for the preservation of order and the enforcement of the laws. Little is known of the police systems which prevailed in the various cities of Greece. In Rome the duties of the policeman seem to have been shared by several classes of officials; the lictor arrested criminals and conducted them into court, and the inspectors, subprefects, and other officers, either personally or by their subordinates, performed most of the civil duties now devolving on the police. In despotic governments the police have exercised important and often oppressive functions. Its beneficent action in sanitary matters, in preventing and detecting frauds, larcenies, and petty crimes, and in promoting the reformation of juvenile offenders, is of recent date.—The police system in France is of considerable antiquity. Previous to the middle of the 15th century, the provost of Paris and his lieutenants, civil and criminal, were charged with maintaining the peace of the city, and with the suppression of vagrancy. About 1446 or 1447 the city was divided into 16 districts, over each of which a commissary of police presided, having under him a certain number of sergeants, the whole being under the control of the provost, to whom in 1448 Charles VII. committed a general jurisdiction over vagrants and malefactors. About 1520 Francis I. deprived the provost of the city of his extensive jurisdiction, and created a provost marshal (*prévôt de maré-*

chaux) for the city and district of Paris, who was authorized to apprehend and punish vagrants and disorderly persons, without appeal. The superintendence of the markets, weights and measures, and cesspools, the cleansing of the streets, the inspection of buildings, and the prohibition of noxious trades, were all subjects of legislation in France at a very early period, statutes having been passed relative to them at various dates between 1350 and 1560. But each had its own inspectors, amenable to no common head. In 1577 the privilege of electing their own police magistrates was granted to the inhabitants of each district of the city. Under Louis XIV. the police attained its highest measure of perfection as a repressive force. A universal espionage was established, and the slightest intimation of restiveness under the yoke of oppression, or the smallest departure from the monarch's views of orthodoxy, was visited with summary arrest and punishment. In its more humane and protective functions it was less successful. Under Louis XV. it partook of the general decay and demoralization which had infected the other departments of government, and furnished ready means of extortion and oppression. The national convention in 1794 reorganized the police and defined its duties. These duties comprised almost every department of administrative government, including the securing of the safety of traffic; the repair of dangerous structures; the superintendence of the cleansing and lighting of the city; the removal of public nuisances; the repression and punishment of all offences against the public peace; the maintenance of good order in and supervision of all public gatherings, festivities, and places of public amusement and resort; the inspection of weights, measures, and food; precautions against accidents, casualties, and epidemics, and measures in mitigation of them if they occurred; the delivery of passports, residence licenses, &c., and the repression of beggary and vagrancy; the supervision of drinking and gaming houses, and of prostitutes; the dispersion of crowds; the police of religious worship and of printing and bookselling; the oversight of theatres, powder mills, saltpetre works, and storehouses of arms; the pursuit of deserters and escaped criminals; the care of the highways, of the public health, and of fires, inundations, and accidents; the superintendence of the exchanges of commerce, of the taxes, of the provision markets, and of prohibited wares; and the protection of public monuments. To these multifarious duties were soon after added the regulation of the fees of health officers and veterinary surgeons, the removal of sick persons and corpses, the recovery of drowned persons, and the care of the public pounds. During the administration of Napoleon I. the city police of Paris attained a high degree of efficiency. Under Louis Philippe the number of the regular policemen (*sergents de ville*) had risen in 1847 to 1,800. During that reign the present system of police respecting prostitution, which had been for many years under police surveillance, was adopted. Under Napoleon III. the Parisian police was metropolitan, comprising the whole department of the Seine, the districts of St. Cloud, Sèvres, and Meudon in Seine-et-Oise, and the market of Poissy. It was in charge of a prefect, who was under the authority of the minister of the interior. He was president of a council of health of 20 members, all physicians, surgeons, or chemists, which had charge of all sanitary matters. Besides this council, there were 11 bureaus, in three divisions, each under a competent head, and each in charge of a class of police regulations. There was also a commissary of police in each of the 80 quarters of Paris. (For the present police organization of Paris, see PARIS, vol. xiii., p. 87.) Besides the local police of Paris, which under some of the Bourbon kings assumed or was endowed with national jurisdiction, there has been for two centuries a system of national police in France, under the direction of a minister of police, whose functions have been mainly detective and repressive. The espionage of suspected strangers visiting the country, or of persons believed to be disaffected or to entertain designs against the government, the correspondence of those regarded as hostile to the reigning authority, and other similar subjects, have been the duties intrusted to it.—In England, from the time of the Saxon kings, there had been an organization, partly voluntary, for the repression of crime, the arrest of criminals, and the maintenance of order. The population was divided into hundreds, and these into tithings or companies of ten freeholders with their families. The principal man of the hundred was the justice of the peace, or local magistrate, for the trial of small causes, and the head man of the tithing was responsible for good order and the arrest of criminals in his limited district. The high sheriff of the county, his deputies, and the constables appointed by the parishes, were eventually substituted for the voluntary officers of the earlier period; but while they answered their purpose tolerably well in the rural districts, they were neither numerous nor efficient enough to repress crime in London. In 1753 a paid police, of very moderate extent, was established in London; but such was the fear of the people lest this measure should lead to encroachment upon their liberties, that it met a violent opposition and was soon repealed. In 1792 an act was passed for the increase of the police courts, the employment of salaried magistrates, and the enlargement of their jurisdiction. In 1800 there were 6 police constables attached to each of the metropolitan police offices, or 48 in all; 60 other constables, under the charge of the chief magistrate at Bow street, patrolled the metropolitan roads; the Thames police establishment, organized in 1798, consisted of 41 officers; the city of London employed and paid

40 more; and besides these there were 868 parish officers serving without pay. The night watch and patrol consisted of 2,044 men for the entire metropolitan district, of whom 803 were in the city of London. The greater part of these men were aged, feeble, infirm, and many of them half starved; their compensation ranged from 17 to 36 cents a night; and they were under the control of more than 70 different boards of officers. This state of things continued with little amelioration till 1829, when Sir Robert Peel's "act for improving the police in and near the metropolis" was passed. This act established an effective constabulary force under two commissioners, but left several petty detached bodies of peace officers within the district. In 1839 it was modified by an act consolidating the entire constabulary force of the metropolis, the city of London excepted. By this act also the entire executive duties of police were intrusted to the commissioners; their sphere of action in regard to all matters properly belonging to police was greatly enlarged; the police courts were assimilated to the other courts of justice, and a single magistrate was empowered to decide, without appeal, questions involving sums of money not exceeding 40 shillings, as well as those cases of offence against the person so constantly recurring in a police court; and the boundaries of the police districts were changed to adapt them to the growth of the metropolis. In 1856 the joint commissioners were superseded by one commissioner, whose salary was fixed at £1,500, and two assistant commissioners were appointed, at a salary of £800 each. The metropolitan police district comprises all the parishes within 15 m. of Charing Cross, except the city of London proper, which has an independent police organization. It embraces an area of 687 sq. m., and in 1871 contained 3,808,360 inhabitants. The total length of streets patrolled day and night by the metropolitan police is 6,612 m. The police force on Jan. 1, 1874, consisted of 26 superintendents, 272 inspectors, 992 sergeants, and 8,593 constables, making a total of 9,883 men. Of these, 4 superintendents, 37 inspectors, 84 sergeants, and 504 constables were employed at the royal dockyards and military stations, and 14 inspectors, 54 sergeants, and 472 constables at various government and private establishments, leaving 22 superintendents, 221 inspectors, 854 sergeants, and 7,617 constables for ordinary duty in the metropolis. The total number of arrests in 1873 was 73,857. The number of designated points where a constable may always be found increased from 103 in 1869, when the system was adopted, to 248 in 1873. There were 161 constables employed on short beats near the principal hackney carriage stands, and a large force is also detailed for the regulation of traffic in the streets and for the protection of passengers at the crossings. Arresting vagrants, licensing peddlers, inspecting public carriages, attending fires, registering the names of prostitutes and examining them under the contagious diseases act, and reporting nuisances, are prominent police functions. Cities, boroughs, and towns in England and Wales maintain police organizations. The rural police or county constabulary force in England is of recent origin. The difficulty of arresting criminals and preventing crime, especially among juvenile offenders, led to its organization. In 1840 parliament passed an act permitting any county, or part of a county, to organize a police force on a plan somewhat similar to that of the metropolitan police. The county of Essex availed itself of the permission the same year; and between 1840 and 1853, 18 English and 4 Welsh counties had adopted it for the whole of each county, and 7 others for parts. In 1856 the "act to render more effectual the police in counties and boroughs" was passed, and there is now a constabulary force in every county, which reports annually to the secretary of state. The organization of this force has greatly diminished the amount of crime, especially among the young, who are now promptly committed to reformatories, and rendered property safer and the administration of justice more uniform. The strength and cost of the police force in England and Wales for two years were as follows:

DESCRIPTION.	Officers and constables.		Total cost.	
	1869.	1870.	1869.	1870.
County constabulary...	9.048	9,272	£749,449	£755,078
Borough police........	7,285	7,852	518,006	529,184
Metropolitan police, with her majesty's dockyard police....	8,915	9,118	785,088	880,212
City of London police..	699	699	64,891	68,052
Total..................	25,897	26,441	£2,116,884	£2,182,521

The number of indictable offences committed, so far as known to the police, was 58,441 in 1869, and 51,972 in 1870. The number of persons arrested for such crimes was 29,278 in 1869, and 26,618 in 1870. The number of persons proceeded against for offences summarily determined was 517,875 in 1869, and 526,869 in 1870.—In Scotland the organization of an efficient police in the large towns dates from 1834, and has been materially modified by subsequent laws. The rural police has been organized under the law of 1857, which is similar in its provisions to the English law of 1856.—In Ireland until 1814 the police was in a chaotic state. The law passed that year led to improvements, but did not remove the management of the force nor the functions of the inferior magistracy from partisan control, by which they were often made the instruments of outrageous abuses. The act of 1836, and its modifications in 1848 and 1857, have greatly improved it. It is quasi-military, being well armed and occupying barracks. The entire police force of Ireland in 1870 comprised 14,007 officers and constables, including the constabulary of 12,472 men and 1,085 metropolitan and 450 local police. The cost of maintaining the entire force during the year was £963,896. There is a metropolitan police for the city of Dublin and vicinity.—In the United States, the provisions for the repression of crime and the detection and arrest of criminals were copied from those of Great Britain. Each county had its sheriff and deputies, and, where there were town organizations, each town its constables. Justices of the peace, of whom there was a considerable number in each county, and often in each town, appointed by the executive, or of late elected by the people of the town or county, had absolute jurisdiction in petty civil and criminal cases, and power to bind the accused over to a higher court in any case. In the larger towns, the danger to property from fires, burglaries, &c., in the night time, led to the appointment of watchmen, who, like those of London, were often aged and infirm men, few, and poorly paid. The organization of a day police is of recent date even in the large cities. New York had only an inefficient night watch till 1845, when a uniformed municipal police was organized, under the direction of the mayor. The present police organization of that city may be taken as representative of the police systems of American cities generally. From 1857 to 1870 New York, with the counties of Kings, Westchester, and Richmond, and the towns of Jamaica, Newtown, and Flushing in Queens county, constituted the metropolitan police district, which was under the supervision of commissioners appointed by the governor of the state. The police force possessed constabulary powers throughout the entire district. It has been claimed for this system that it was superior to the municipal, inasmuch as the police force possessed constabulary powers not limited to the city, and, as their appointment was vested in the chief magistrate of the state, they were removed from the influence of local politics. The city charter of 1870 abolished the metropolitan police organization in New York city, and created the department of police of the city of New York, which consists of a board of police comprising four commissioners, who are appointed by the mayor and receive an annual salary of $6,000, the president of the board receiving $8,000, and the police force and officers appointed by the board. With an area of 41 sq. m. and a population of more than 1,000,000, the city is divided into two inspection districts, 19 surgeons' districts, and 32 precincts, the last named being subdivided into patrol beats or posts. This territory is patrolled by about 1,900 men, besides about 500 employed in special service. The day posts are about double the extent of the night posts, and consequently the number of men on duty during the night is twice as great as that during the day. The general administration of the police is vested in the board of police, who meet at irregular intervals, and are empowered to make orders, rules, and regulations of general discipline, to make appointments, transfers, and assignments to duty of officers and men, and to hear charges against members of the force. The police force (which varies in numbers from time to time) in July, 1875, consisted of a superintendent, 4 inspectors, 34 captains, 134 sergeants, 2,272 patrolmen, and 80 doormen, making a total of 2,527. There are also 19 surgeons. The superintendent is the chief executive officer. He is appointed by the board, to whom he makes written quarterly reports, and receives an annual salary of $6,000. He is required, among other things, to be present at all serious fires in the city; to command the police force in quelling riots or tumultuous assemblages; to see that the state laws and city ordinances are enforced in the metropolis; and to inform the board of police concerning the presence in the city of any epidemic, or contagious or infectious disease, or any nuisance detrimental to the public health. Inspectors rank next to the superintendent; they perform general executive duties pertaining to the force, see that the rules and regulations of the board are complied with, and report quarterly in writing to the superintendent. A captain has charge of the police affairs of a precinct, in which he is required to preserve the peace and see that the law is not violated; the officers and men of the precinct are under his direct command. He reports every morning to the central office. The force of the precinct is divided into two platoons and four sections. A sergeant is assigned to the command of each section; he is required to patrol the precinct and see that the roundsmen and patrolmen are performing their duties properly. Each of the station houses is also in charge of a sergeant. The officers lowest in rank are the roundsmen, of whom there are four for each precinct, one being assigned to each platoon. They are required to see that patrolmen perform their duties faithfully. Among other duties patrolmen are required frequently during the night to examine all doors and low windows of dwellings, stores, and other buildings, as well as areas and area gates; to see that street lamps are burning; and to report concerning disorderly houses and places, and all persons known or suspected of being policy dealers, gamblers, receivers of stolen property, thieves, burglars, or offenders of any kind. Besides the regular organization of the force for ordinary purposes, several bodies or squads are assigned to special duties. The sanitary police company, about 65 in number, are required to inspect buildings, premises, business pursuits, sewerage, drainage, ventilation, &c., and all matters supposed to be dangerous to life or detrimental to health, and to make report thereof to the board of police; to report nuisances; to seize meat, fish, and other food that may be unfit for consumption; and to enforce the orders and regulations of the board of health concerning the cleanliness and sanitary needs of the city. Officers of this company are detailed to visit the public schools and ascertain the names and residences of habitual truants, with a view to their commitment to the juvenile asylum or elsewhere. During the quarter ending March 31, 1875, 1,826 such visits were made by six officers to day schools, and 324 to evening schools. The steam-boiler inspection squad is also a part of the sanitary company. It is their duty to inspect all stationary steam boilers used for motive power in the city; and the examining engineers are required to examine applicants for the necessary certificates of qualification as engineers. The mounted squad was established in 1871, to patrol on horseback the avenues leading to Central park, where the presence of mounted police is necessary to prevent fast and reckless driving. There is also a mounted patrol in four rural precincts, where police of this kind has been found more economical and efficient than the ordinary patrolmen, one of the former being equal to three of the latter. The harbor police, by means of a steamboat and row boats, patrol the waters of the harbor adjacent to the city. The ordinance squad, not exceeding 20 men, is under the direction of the mayor, for enforcing city ordinances. There are also the Broadway squad, on duty during the day in that thoroughfare to aid pedestrians in crossing; the detective squad, 18 in number; court squads, special service squads, &c. The police are required to assist, advise, and protect emigrants, strangers, and others in public streets, steamboats, ship landings, and railroad depots, and to take charge of all lost children and foundlings found in the streets. They also have general supervision over all carts, hacks, omnibuses, and other public vehicles, pawnbrokers, venders, second-hand dealers, junk shops, intelligence offices, and auctions. The recovery and restoration to the owner of lost or stolen property is a prominent duty. Two important functions, not strictly of a police nature, which have been imposed upon the New York police, relate to street cleaning and elections. In 1872 it was made the duty of the board of police to see that all public thoroughfares, places, &c., are kept in a clean, healthful, unobstructed condition; the immediate supervision of this department is vested by the board in the bureau of street cleaning. All elections held in the city are under the direction of the board of police, who appoint inspectors and other election officers, and to whom the returns are transmitted. The police telegraph is an essential feature of the organization, without which an increased force of nearly 50 per cent. would be necessary. The central office is connected with all station houses and some public institutions. The public parks of the city are guarded by a separate force under the control of the park commissioners. The total number of arrests made by the police of New York during the quarter ending March 31, 1875, was 18,679, including 7,533 native, 7,608 Irish, and 1,916 German persons. The value of property delivered to owners was $298,613; 448 lost children were recovered, of whom 414 were restored to parents or guardians and 34 sent to the commissioners of charities and correction; lodgings were furnished in the station houses to 79,105 indigent and unfortunate persons; 1,267 stores, dwellings, and buildings were found open; 1,503 complaints of nuisances were reported to the health department; 907 examinations for engineers were held, and 555 steam boilers were inspected. The total expenditures of the department of police amounted to $985,088, of which $796,581 were for police purposes, $187,256 for street cleaning, and $1,249 for elections. Other statistics of the New York police are given in the article on that city, vol. xii., p. 393.

POLIGNAC, Jules Auguste Armand Marie, prince de, a French statesman, born in Versailles, May 14, 1780, died in Paris, March 2, 1847. He was a son of the duchess de Polignac, the favorite of Marie Antoinette. In 1804 he and his brother Armand (1771–1847) were imprisoned as conspirators against Napoleon. Having escaped shortly before the fall of the empire, he was under Louis XVIII. for some time minister in Rome, and the pope made him a Roman prince in 1820. He was ambassador in London from 1823 to 1829, when he became minister of foreign affairs, and replaced Martignac as president of the council. Notwithstanding the military glory acquired under his administration by the conquest of Algiers, his unpopularity and ultra-royalism proved fatal to Charles X. In the revolution of July, 1830, incited by the arbitrary ordinances which he had signed, he barely escaped being mobbed. He was arrested while fleeing in disguise, tried by the court of peers, and sentenced to imprisonment for life. He was detained at Ham till the amnesty of 1836, when he retired to London.—Prince CAMILLE ARMAND JULES MARIE (born Feb. 6, 1832), a relative of the preceding, served in the confederate army during the American civil war, and in 1870–'71 in the Franco-German war. Subsequently he was engaged in journalism.

POLITIANUS, Angelus. See POLIZIANO.

POLITICAL ECONOMY, properly, an exposition of the measures necessary for directing the movements of society so that man may act in harmony with those natural laws which control his efforts to improve his condition. Social science treats of the laws themselves. Prof. Robert E. Thompson would substitute for the name political economy that of national economy. Great confusion exists not only in regard to the definition of political economy itself, but as to the meaning of the various expressions used in treating of the subject, and even as to a general understanding of its scope. Some writers have treated it as a science, others as an art, and Sir James Steuart speaks of it as a combination of the two. Mr. Senior considers it "the science which treats of the nature, the production, and the distribution of wealth." Archbishop Whately would give it the name of "catallactics, or the science of exchanges." J. R. McCulloch considers it "the science of the laws which regulate the production of those material products which have exchangeable value, and which are either necessary, useful, or agreeable to man." Storch says it "is the science of the natural laws which determine the prosperity of nations, that is to say, their wealth and civilization." Sismondi considers "the physical welfare of man, so far as it can be the work of government or society as the object of political economy." Say defines it as "the economy of society; a science combining the results of our observations on the nature and functions of the different parts of the social body." John Stuart Mill considers it "the science which treats of the production and distribution of wealth, so far as they depend upon the laws of human nature," or "the science relating to the moral or psychological laws of the production and distribution of wealth." The progress thus far made in political economy has been slow and uncertain, and in its entire range there is hardly a doctrine or even the definition of an important word which is accepted beyond dispute. In 1844 De Quincey acknowledged that it did not advance, and that from the year 1817 it had "on the whole been stationary;" and he adds: "Nothing can be postulated, nothing can be demonstrated, for anarchy even as to the earliest principles is predominant." Amid all their discords and disagreements, it is possible to divide political economists under two general heads: those who treat the subject as a deductive science, "in which all the general propositions are in the strictest sense of the word hypothetical;" and those who treat it by the inductive method. They may also be divided into those who follow Ricardo with his fundamental doctrine of the theory of rent, and those who have given in their adhesion to Carey's law of the occupation of the earth. The adverse views as to the practical effects of the application of protection and free trade are quite inadequate to serve the purpose of division, since many of the believers in one or the other of these doctrines quite disagree in regard to other and important questions. The discordant state of this so-called science therefore renders it necessary in this place to trace out the history of economic ideas, and to give an account of the views and opinions at present held by the adverse schools and their various teachers.—A science underlying the art of political economy was quite unknown to the ancients, although they had brought under observation many facts which gave rise to true and valuable economic doctrines. These doctrines or rules were however quite empirical, isolated, and not elaborated into broad and far-reaching principles, and had in view far more the advancement of the state, its treasury, and its military power, than the prosperity, the happiness, and the freedom of the people. Nevertheless it is important to recognize the fact of the origin of political economy in these early and imperfectly stated doctrines. The ancient code of India, the Institutes of Manu, contains provisions as to the revenues, usury, &c.; but these provisions are merely designed to establish and fix the respective rights and duties of the sovereign and his subjects, and of the subjects among themselves. In Attica agriculture was commended and encouraged, and the price of agricultural produce was generally low; while the products of various branches of diversified industry were important, but the prices were generally high. Foreign trade was carried on extensively with the various countries on the shores of the Mediterranean and Black seas. Duties were levied upon foreign imports, but almost if not quite wholly with a view to the revenue of the state. Interest was high, and money was scarce and hard to procure. "In every Greek state," says Böckh, "the finances were in the hands of the sovereign power; and at Athens the legislation on financial matters belonged to the people, the administration of them to the supreme council. Then, as well as now, the administration of the finances was considered one of the most important branches of the public affairs, and the statesman who, like Aristides or Lycurgus, succeeded in placing them in a flourishing condition, gained the good will of the people and the admiration of posterity." The laws of Lycurgus deal with many economic questions, such as money, usury, taxes, lands, and the employment of the people; but almost the sole idea throughout these laws is the establishment of the military power of Sparta. "Lycurgus, or the individual to whom this system is owing, whoever he was," says Grote, "is the lawgiver of a political community; his brethren live together like bees in a hive, with all their feelings implicated in the commonwealth, and divorced from house and home." The earliest treatise on an economic subject is believed to be "The Eryxias, or About Wealth," erroneously attributed to Æschines Socraticus, a disciple of Socrates. Plato ("The Republic," book ii.) calls attention to the necessity for separate employments, and in the opinion of Blanqui "he has pointed out the advantages of a division of labor with perfect clearness, and appears to us to take from Adam Smith the merit of this discovery." He also regards the passage in which Plato conducts his reader toward a definition of money by tracing up the necessity, in a community of diversified employments and wants, of "an established coinage as a symbol for the purposes of exchange," as most remarkable, partaking of the nature of most ingenious art. On the other hand, in the opinion of Say, Plato "has with tolerable fidelity sketched the effects of the separation of social employments, but solely with a view to point out man's social character, and the necessity he was in, from his multifarious wants, of uniting in extensive societies, in which each individual might be exclusively occupied with one species of production. It is an entirely political view, from which no other consequence can be drawn." Xenophon contributed two brief essays to early political economy, one "On the Revenues of Athens," the other "The Economist." The political economy of Xenophon, as Blanqui holds, "rests on no other foundation than that of Plato. Whenever he undertakes to analyze the operations of labor, to trace revenue to its source, to determine the utility of things, the clearness of this writer is admirable; but as soon as he touches the question of the distribution of profits, the Greek prejudices reassume their sway, and the author falls back into the politics of Plato and Aristotle, faithful interpreters of the contemporary oligarchy." Carey says: "Xenophon urged upon his Athenian countrymen that, in default of the domestic market for food that would have resulted from the proper development of the mineral treasures with which their soil abounded, agriculture had become impossible; many having been forced to abandon it, becoming usurers or brokers;" and he adds: "This is probably the earliest exhibit on record of the dependence of agriculture on the mining and manufacturing industries." Aristotle, however, in a greater degree than any other of the ancients, contributed to the foundation of political economy. His three treatises—"Ethics," which treats of the regulation of the individual man; "Politics," of the relation of man toward others in a social capacity, both private and public, the family and the state; and "Economics," of the relation of man toward property—constitute in a measure a connected work, each being dependent on and interwoven with the others. The expression political economy was first used by Aristotle, and is to be found in the "Economics," book ii. chap. i. He lays down the dogma that the bounty of nature is the only true source of wealth, and he holds in great abhorrence trading and usury, which latter, he says, "is most reasonably detested, as the increase of our fortune arises from the money itself, and not by employing it to the purpose for which it was intended." In his "Rhetoric" he lays down the most important principles of political policy as follows: finance, peace and war, the safeguard of the country, importation and exportation, and legislation. But little attention was paid to economic studies for many centuries after the time of Aristotle. Agriculture was looked upon with much more favor than any other employment involving labor, but even farm labor was performed almost entirely by slaves belonging to and employed by the landlords. The light in which trade was regarded by the Romans may be gathered from Cicero, who in his *De Officiis* says: "The gains of merchants, as well as of all who live by labor and not skill, are mean and illiberal. The very merchandise is a badge of their slavery." "All artisans are engaged in a degrading profession," and "there can be nothing ingenuous in a workshop." Slavery was the very foundation of the industrial system of both Greeks and Romans, as war was of the national policy. The great Roman roads were built with a view to their military advantages, and not to trade and industry. Agriculture was the principal industrial occupation of the Romans, who were alike indisposed to diversified industries and foreign trade. Blanqui says: "All the Roman legislation, from the glorious days of the republic to the fall of the empire, is but the faithful reproduction of the unconquerable prejudices of this people against labor and industry." Augustus pronounced the penalty of death against the senator Ovinius for having degraded himself by conducting a manufactory. The Justinian code (A. D. 528–535) takes cognizance not merely of the laws but of the arts, the industries, and agriculture, and has been pronounced "the first indication of a systematic political economy." The "Capitularies" of Charlemagne, promulgated in 801, have an economic interest from the fact that they take account as well of the employment and condition of the people as of the revenues of the state and the mode of assessing and collecting these latter. Yet the sovereign and the state were subjects of far more solicitude than the condition of the people. Hence for this among other causes Charlemagne failed to found an enduring empire.—During the earlier parts of the middle ages no advance was made either in commercial adventure or in letters; but "the fortunate enterprises of the Portuguese and Spaniards during the 15th century, the active industry of Venice, Genoa, Florence, Pisa, the provinces of Flanders, and the free cities of Germany, about the same period, gradually directed the attention of some philosophers to the theory of wealth." These investigations originated in Italy. "As far back as the 16th century," adds Say, "Botero had been engaged in investigating the real sources of public prosperity." The real and substantial foundation of systematic political economy may be said to have been laid about the close of the 16th century. Botero's "Cause of the Greatness of Cities" (London, 1635), translated from a work of his published in Venice, 1598, is one of the earliest modern treatises on an economic subject. McCulloch says it "is principally worthy of notice from its showing that the author was fully master of all that is really true in the theory of Malthus." The earliest general treatise of modern times, and the first bearing the title of political economy, is the *Traité de l'économie politique*, by Antoine de Montchrestien (4to, Rouen, 1613). This work treats of the utility of mechanic arts and the regulation of manufactures, the employment of men, the trades most important to communities, commerce, transportation, money, &c. In 1613 Antonio Serra published in Naples a volume on the causes which tend to aid an accumulation of the precious metals in those countries which do not produce them; and in 1616 Gian Donato Turbulo published in the same city a treatise on the money of the country. About this time treatises on commerce and the prohibitive system were published by Duarte Gomez (Lisbon, 1622) and Juan de Castañares (1626).—The attention of the earliest English writers on political economy was directed to foreign trade. They saw that it was desirable to have a metallic currency suited to the wants of the business of their country, and while advocating the extension of this trade they recommended the adoption of such measures as would cause gold and silver to flow into the country, and not out. The policy advocated by this school is known to economists as the mercantile system. It was supported among others by Thomas Mun in "A Discourse of Trade from England unto the East Indies" (1621), and by the same author in "England's Treasure by Forraign Trade, or the Balance of our Forraign Trade is the Rule of our Treasure" (1664). The last named treatise was probably written as early as 1635–'40. In 1663 appeared "England's Interest and Improvement," by Samuel Fortrey, who held that the trade with France occasioned a clear loss equal to the balance against England. This was attacked by an anonymous author in "England's Great Happiness" (London, 1677). Another writer of this school was Misselden, who in 1623 published his "Circle of Commerce." In 1668 appeared Sir Josiah Child's "Brief Observations concerning Trade and the Interest of Money," of which a new edition appeared in 1690, entitled "A new Discourse of Trade." Its author is usually classed among the mercantile school, but he did not regard a direct examination of the comparative amount of imports and exports, or even the movements of the precious metals, as a proper test of the advantages or disadvantages of a foreign trade; he rather looked to its increase or decrease as presenting the most tangible evidence. He advocated reducing the rate of interest from 6 to 4 per cent., believing it to be the *unum magnum*, as he expressed it, and that it would greatly facilitate business. He recommended "the prevention of the exportation of our wool, and encouraging our woollen manufactures," and that in Ireland the "linen rather than the woollen manufacture be set up;" further, that the trade of those countries "that vend most of our manufactures, or supply us with materials to be further manufactured in England," be most encouraged. Andrew Yarranton published "England's Improvement by Sea and Land: to outdo the Dutch without Fighting, to pay Debts without Moneys, to set at Work the Poor of England with the Growth of our own Lands," &c. (2 parts, 1677–'81). He designed to advance the prosperity and power of England by the introduction of a general system of banking, thus furnishing "the great sinews of trade, the credit thereof making paper go in trade equal with ready money," a registry of real estate to facilitate its transfer and mortgage, the improvement and development of the production and trade in linen, woollen goods, and iron, the introduction of canals and the improvement of rivers and harbors, with a view to facilitating internal trade and intercourse. He held that a country desiring to be rich, powerful, and happy must introduce a diversified industry; and he recognized the necessary means for bringing about its development. "Above all," says Patrick Edward Dove, who regards him as the founder of English political economy, "we must note his prospective sagacity, for he points out in detail the very course that England has pursued, and the very elements that were to contribute to her commercial superiority."—An important era in the history of political economy, as well as of industrial development, was the year 1661, when Louis XIV. made Colbert comptroller general of the finances of France. He reduced the national finances to system and order, and instituted a complete plan of checks and balances; reformed abuses in this department, and punished those who had been guilty of them; increased the revenues of the state while at the same time he decreased the burdens of the people; provided for economical expenditures, and abolished many of the internal taxes; developed agriculture, manufactures, the arts, and the sciences; improved roads and rivers, built canals, and by every means fostered and increased the internal commerce of the country. By some writers certain features of his tariff laws of 1664 and 1667 have been condemned; but on the other hand we are assured that for several years before his administration "France swarmed with vagabonds and mendicants," and had reached "the most profound depth of commercial depression," and that under the laws of which he was the author she rose to "a point of wealth and industry far beyond any she had ever reached since the foundation of the monarchy;" and M. Say says: "It is not true that Colbert ruined France," but that, "on the contrary, France under Colbert's administration emerged from the distress in which two regencies and a weak reign had involved her."—The various restrictions upon trade, especially upon the importation of manufactured goods and the exportation of the raw materials used in manufactures, at this time, and even later, and especially in England, were very onerous. The penalties for the infringement of the laws were in many cases cruel and even barbarous. This system, with the policy pursued under it, was attacked by various writers. Among the earliest and ablest of these was Sir Dudley North, who published "Discourses on Trade" (4to, London, 1691). Among the doctrines held by him as fundamental were: "That the whole world as to trade is but as one nation; that money is a merchandise whereof there may be a glut as well as scarcity, and that even to an inconvenience; that a people cannot want money to serve the ordinary dealing, and more than enough they will not have; and that money exported in trade is an increase to the wealth of a nation." Sir William Petty, in "Quantulumcunque, or a Tract concerning Money," had in 1682 attacked the theory of "the balance of trade;" and at a subsequent day there were many champions on both sides of this vexed question; among others, Dr. Davenant (1695–1712) and the Rev. Josiah Tucker (1758), who espoused the so-called mercantile theory, and Sir Matthew Decker (1744) and Joseph Harris (1757–'8), who opposed it. In 1698 appeared in London "Historical and Political Essays, or Discourses on Several Subjects," including money, government, &c., by John Locke, comprising papers which had been previously published, in which he had for the first time promulgated some of the favorite theories in regard to money now held by European economists. He taught that men in their bargains contract "not for denominations or sounds, but for the intrinsic value, which is the quantity of silver by public authority warranted to be in pieces of such denominations;" and further, that "one metal alone can be the money of account and contract, and the measure of commerce in any country; . . . all other metals, gold as well as lead, are but commodities."—In 1758 appeared at Versailles the *Tableau économique, et maximes générales du gouvernement économique*, by François Quesnay, followed by *Théorie de l'impôt*, by the elder Mirabeau (1760), *La philosophie rurale*, also by Mirabeau (1763), and various other works by Quesnay and his disciples, expounding the physiocratic or agricultural system of economy. The physiocratists held that the earth is the sole producer of wealth, and divided the industrial members of society into three classes: 1, the proprietors of the land; 2, the cultivators, whom they regarded as a productive class; 3, the mechanics, manufacturers, and merchants, whom they styled the unproductive class. That portion of his income which the landlord laid out in the improvement of his land they characterized as productive expenses; and in so far as the landlord by these expenditures aided the farmer in increasing the amount of his produce, the landlord became one of the productive class. They maintained that the labor of mechanics, manufacturers, and artisans was unproductive, because it merely replaced the stock which employed them, together with the ordinary profits of that stock; and that mercantile stock was unproductive because it merely continued the existence of its own value. They admitted that mechanics, manufacturers, and merchants might augment the revenue and wealth of society, but that it could only be accomplished by parsimony or privation. They believed that the most perfect freedom of trade with all nations was the great desideratum for agriculture. Dissenting entirely from the central idea of this school and its logical deductions, Adam Smith, in 1776, expressed the opinion that "with all its imperfections it is, perhaps, the nearest approximation to the truth that has yet been published upon the subject of political economy." Among the most eminent of the physiocratists was Turgot, afterward comptroller general of finances, who early embraced the views of Quesnay, and in 1771 published *Réflexions sur la formation et la distribution des richesses*, the ablest of the treatises of this school.—A Spanish treatise well worthy of attention is "The Theory and Practice of Commerce and Maritime Affairs," by Gerónimo de Ustariz (Madrid, 1724; English, 2 vols., 1751). "Though imbued with the prejudices of the mercantile system," says McCulloch, "it is valuable for the information it affords respecting the internal policy, trade, and state of Spain from the reign of Charles V. downward." Montesquieu's *De l'esprit des lois* (Geneva, 1748) is worthy of note in the history of political economy, on account of its reference to such subjects, particularly in regard to foreign commerce, taxes, public debts, and money. His theory of money very closely resembles the views of Hume upon the subject, which are now held by so many economists.—Among the contributions to political economy up to the end of the 18th century, none evince greater reasoning power than the "Political Discourses" of David Hume (1752). Among those essays which come within the limit of political economy are "Commerce," "Refinements in the Arts," "Money," "Interest," "The Balance of Trade," "The Jealousy of Trade," "Taxes," and "Public Credit." According to the doctrines of these essays, everything in the world is purchased by labor, and our passions are the only causes of labor; when a nation abounds in manufactures and the mechanic arts, scientific agriculture becomes possible, and the cultivators of the soil redouble their industry and attention, the surplus produce being readily exchanged for the products of those manufactures and mechanic arts, and the land furnishes more than is needed for the support of those who cultivate it; while on the other hand, where this diversified industry does not flourish, there is no inducement for the agriculturists to increase their skill and industry, because of the difficulty of exchanging any surplus. Foreign trade by its imports furnishes raw materials for new manufactures, and by its exports gives employment to labor, which in the absence of this trade might be wasted. Necessity is the great incentive to industry and invention—rather the fears than the hopes, the aspirations, and the ambition of mankind. Money Hume considers not properly one of the subjects of commerce, but "only the instrument which men have agreed upon to facilitate the exchange of one commodity for another." He holds to the idea that "an increase in the amount of money in a country is rather inconvenient than advantageous, the influence which it exerts being to heighten the price of commodities, and oblige every one to pay a greater number of these little yellow or white pieces for everything he purchases." But he did not fail to observe in actual experience an apparent departure from the course here laid down. He had been led to notice that "in every kingdom into which money begins to flow in greater abundance than formerly, everything takes a new face; labor and industry gain life; the merchant becomes more diligent and skilful, and even the farmer follows his plough with greater alacrity and attention." He then enters into a series of reasonings to show that it is not immediately upon the receipt of this money into a country that a rise in prices takes place, but that "some time is required before the money circulates through the whole state, and makes its effects felt on all ranks of the people." The rate of interest, he holds, "is not derived from the quantity of the precious metals," but "high interest arises from three circumstances: a great demand for borrowing, little riches to supply that demand, and great profits arising from commerce." "I should as soon dread," he adds, "that all the springs and rivers should be exhausted, as that money should abandon a kingdom where there are people and industry." While deprecating as unwise and illiberal all "those numberless bars, obstructions, and imposts," which nations have laid with the object of retaining the precious metals, he says that "all taxes upon foreign commodities are not to be regarded as prejudicial or useless, but those only which are founded upon the jealousy" of the balance of trade. "A tax on German linen encourages home manufactures, and thereby multiplies our people and industry. A tax on brandy increases the sale of rum and supports our southern colonies."—Among the earliest of the systematic books on political economy must be included *Lezioni di commercio, o di economia civile*, by the Abate Antonio Genovesi (2 vols., Naples, 1757). In the opinion of McCulloch, it "is one of the best that has been written on the narrow and hollow principles of the mercantile system;" but the denunciation here implied should be taken with much allowance for McCulloch's prejudices. The book is celebrated, and has often been reprinted.—In 1767 appeared in London "An Inquiry into the Principles of Political Economy, being an Essay on the Science of Domestic Policy in Free Nations," by Sir James Steuart, a countryman of Hume. This was the largest and most elaborate book on the subject which had then been written in English. It treats in detail of population, agriculture, trade, industry, money, coin, credit, debts, interest, banks, exchange, public credit, and taxes. Economy in general Steuart defines as the art of providing for all the wants of a family with prudence and frugality. Political economy he regards as an art, and also a science; and among its important objects are "to provide everything necessary for supplying the wants of society, and to employ the inhabitants in such a manner as naturally to create reciprocal relations and dependencies, so as to make their several interests lead them to supply one another with their reciprocal wants." Population he considers limited by the amount of food produced, and "that when too many of a society propagate, a part must starve." He holds that if a nation would aim to be continuously great and powerful by trade, she must first apply closely to the manufacturing of every natural product of the country; and that when a people find the balance of trade to be against them, it is to their interest to take such measures as will correct the evil. He attacks the theory of Locke and Hume respecting the effect of an increased volume in the circulating medium upon prices. He argues that, while the wealth of a country undoubtedly exerts an influence upon the prices of certain commodities, prices are really regulated by "the complicated operations of demand and competition;" and that when Hume says that "the price of every commodity is in proportion to the sum of money circulating in the market for that commodity," it really means that the money to be employed in the purchase of it is a measure of the demand for it; and it in no wise interferes with Steuart's own proposition respecting the operation of supply, which is fundamental. In 1772, at the request of the East India company, the same author prepared "The Principles of Money as applied to the Coin of Bengal," in many respects a very able treatise.—In 1776 appeared in London the first edition of the great work of Adam Smith, destined to exert so decided an influence on political economy and legislation: "An Inquiry into the Nature and Causes of the Wealth of Nations." This remarkable book treats "of the causes of improvement in the productive powers of labor, and the order according to which its produce is naturally distributed among the different ranks of the people; of the nature, accumulation, and employment of stock; of systems of political economy; of the revenue of the sovereign or commonwealth." Dr. Smith holds that the annual labor of every nation is the fund which originally supplies it with what it annually consumes, and that the relative proportion which that produce bears to the consumers is the measure of their supply in the necessaries and conveniences of life: that the greatest improvement in the productive power, skill, and judgment of labor has arisen from the division of labor; that the extent of the division of labor is limited by the market for its products; and that labor is the only universal as well as accurate measure of value, or the only standard by which we can compare the values of different commodities at all times and in all places. He says that the demand for labor can only increase in proportion to the increase of the "funds destined for the payment of wages;" and yet, while justly holding that it is labor which supplies a people with what they consume, he says that "the attention of government never was so unnecessarily employed as when directed to watch over the preservation or increase of the quantity of money in any country." In his complicated arguments respecting "stock"—which he says consists of two parts, that which the possessor "expects is to afford him revenue," which "is called his capital," and also that which supplies his "immediate consumption"—he involves himself in some of the most serious fallacies to be found in his book, the deductions from which are fatal to much of his system. Money he terms "the great wheel of circulation, the great instrument of commerce," and adds that it "makes a part and a very valuable part of the capital" of a country or people, and that when possessed of it we can readily obtain whatever else we have occasion for. "The great affair is to get money; when that is obtained, there is no difficulty in making any other purchase." Here, it will be observed, he recognizes the important fact that money possesses a quality not to be found in any other commodity: its universal acceptability among men, its power to purchase anything which man desires to sell. In tracing the general progress of wealth, he illustrates the importance of the diversification of industry to the farmer as follows: "An inland country naturally fertile and easily cultivated produces a great surplus of provisions beyond what is necessary for maintaining the cultivators; and on account of the expense of land carriage, and inconveniency of river navigation, it may frequently be difficult to send this surplus abroad." When then workmen engaged in other pursuits settle in the neighborhood, "they work up the materials of manufacture which the land produces, and exchange finished work" "or the price of it for more materials and provisions." "They give a new value to the surplus part of the rude produce, by saving the expense of carrying it to the water side, or to some different market; and they furnish the cultivators with something in exchange for it that is either useful or agreeable to them, upon easier terms than they could have obtained it before. . . . They are thus both encouraged and enabled to increase this surplus produced by a further improvement and better cultivation of the land; and as the fertility of the land had given birth to the manufacture, so the progress of the manufacture reacts upon the land, and increases the fertility." As the work improves, more distant markets are reached; "for though neither the rude produce, nor even the coarse manufacture, could without the greatest difficulty support the expense of a considerable land carriage, the refined and improved manufacture easily may. In a small bulk it frequently contains the price of a great quantity of rude produce." With all its inconsistencies, few books have exerted so great an influence upon the affairs of mankind.—In 1798 appeared anonymously "An Essay on the Principle of Population as it affects the Future Improvement of Society," the author of which was the Rev. T. R. Malthus. New revised and enlarged editions have since been published with the name of the author, the sixth in 1826. According to its preface, this publication "owes origin to a conversation with a friend on the subject of William Godwin's essay on avarice and profusion in his 'Inquirer.'" In addition to an examination of the principle of population, and as a part of his subject, Malthus reviews the doctrines of Godwin as well as those of Condorcet, both of whom held to the possible progress of man toward future perfection, and a consequent reign of equality, peace, and justice. Impressed with the force of Godwin's protest against the defects and failures of the existing social organization, in the essay above referred to and in his "Inquiry concerning Political Justice" (1793), respecting the unequal distribution of property, Malthus aimed to overthrow it by presenting evidence that the inequality among mankind was due to a natural law. His principle is that "population when unchecked increases in a geometrical ratio, while subsistence increases only in an arithmetical ratio;" or, practically stated, that "in two centuries the population would be to the means of subsistence as 256 to 9, in three centuries as 4,096 to 13, and in 2,000 years the difference would be almost incalculable." He does little more than state his proposition, when, almost without presenting proof in regard to the actual power of increase in man and food respectively, he proceeds to show what have been the checks to increase of population throughout the various countries of the world. Population, he holds, "is necessarily limited by the means of subsistence," and "invariably increases where those means increase, unless prevented by some very powerful and obvious check." These checks he divides into the positive and the preventive. The former "include every cause, whether arising from vice or misery, which in any degree contributes to shorten the natural duration of human life," among which may be enumerated "unwholesome occupations, severe labor, exposure to the seasons, extreme poverty, bad nursing of children, great towns, excesses of all kinds, the whole train of common diseases, and epidemics, wars, plagues, and famine." The preventive checks include abstinence from marriage and sexual intercourse from considerations of prudence, and all vice and immorality tending to render women unprolific. Few books have formed the subject of greater discussion and controversy than this; and it is difficult to say whether among economic writers those who do or who do not now accept its doctrines form the larger number. Yet it must be acknowledged that these doctrines have taken a hold upon the minds of men which it is difficult to shake off. According to Prof. R. E. Thompson, Malthus's main position was anticipated by Herrenschwand in his *Discours fondamental sur la population* (1786). In 1820 Godwin published his work "On Population, an Inquiry concerning the Power of Increase in the Numbers of Mankind, being an Answer to Mr. Malthus's Essay on that Subject." The "Inquiry" comprises a careful examination of the progress of population throughout the world, and of the causes which tend to prevent its increase, of the means of subsistence of man, and a review of Malthus's doctrines from a moral as well as a philosophical standpoint. Godwin gives as his reason for producing his book, that Malthus had said in his preface that the "Essay on Population" was indebted to his writings for its existence; and as "it still holds on its prosperous career," "I cannot consent," he adds, "to close my eyes for ever, with the judgment, as the matter now seems to stand, recorded on my tomb, that in attempting one further advance in the route of improvement, I should have brought on the destruction of all that Solon, and Montesquieu, and Sidney . . . had seemed to have effected for the redemption and the elevation of mankind." He says that Malthus's book had then been before the public 20 years without any one, so far as he knew, attempting a refutation of his main principle. One of the most detailed examinations of the work of Malthus which have been published is "The Law of Population," by Michael Thomas Sadler, M. P. (London, 1830). In addition to an elaborate answer to Malthus's theory, Mr. Sadler develops a doctrine of population. "The prolificness of human beings," he says, "otherwise similarly circumstanced, varies inversely as their numbers;" and he presents a mass of evidence to prove that nature has not "invested man with a fixed and unvarying measure of prolificness," but that the Creator has "regulated the prolificness of his creatures in reference to the circumstances in which his providence shall place them, instead of leaving that regulation to the busy, selfish, and ignorant interference of men." In articles published in July, 1830, and January, 1831, and now included in the collection of his essays, Macaulay attacked Sadler's book with much severity, and at the same time indicated unmistakably his belief in the doctrines of Malthus. The Rev. Thomas Chalmers, D. D., who had thoroughly imbibed these doctrines, published a volume on "Political Economy in connection with the Moral State and Moral Prospects of Society" (Glasgow, 1832). Fearing "a sweeping, headlong anarchy," he aimed to present the evidence of the "tremendous evil" of over population, and at the same time to appeal to his countrymen to take steps to "avert it from their borders." In 1840 appeared in Edinburgh "The Principles of Population, and their Connection with Human Happiness," by Archibald Alison (2 vols. 8vo), the first draft of which, says the author, was composed in 1809 and 1810, while the treatise was rewritten between 1819 and 1828. This book is wonderfully rich in facts and illustrations, and deduces a theory of self-adjustment in the power of increase in population which may be briefly stated as follows: There is a rapid increase of numbers in the early stages of society, a gradual retardation as society advances, and an ultimate stationary condition in its last stages. It need hardly be added that Mr. Alison is an uncompromising adversary of Malthus, and that he sees nothing in this question which can give any cause for alarm for the future of mankind upon the earth. In 1841 Thomas Doubleday published in London "The true Law of Population shown to be connected with the Food of the People" (new ed., 1854), in which he undertakes to demonstrate that "whenever a species or genus is endangered, a corresponding effort is invariably made by nature for its preservation and continuance, by an increase of fecundity or fertility; and that this especially takes place whenever such danger arises from a diminution of proper nourishment," and that consequently "the deplethoric state is favorable to fertility, and that on the other hand the plethoric state is unfavorable to fertility." Thus "there is in all societies a constant increase going on among that portion of it which is the worst supplied with food; in short, among the poorest." "The Westminster Review" for April, 1852, contains "A New Theory of Population," understood to be by Herbert Spencer, deduced from the general law of animal fertility. It argues that an antagonism exists between individuation and reproduction; that matter in its lower forms, that of vegetables for instance, possesses a stronger power of increase than in all higher forms; that the capacity of reproduction in animals is in an inverse ratio to their individuation; that the ability to maintain individual life and that of multiplication vary in the same manner also. He further demonstrates that "the ability to maintain life is in all cases measured by the development of the nervous system." In Spencer's "Principles of Biology" the doctrines here stated have been further elaborated and illustrated. "Population and Capital," consisting of lectures delivered before the university of Oxford in 1853–'4, by George K. Rickards (London, 1854), contends by careful induction from facts that the truth is the very reverse of Malthus's theory; "that the productive power of a community tends to increase more rapidly than the number of its inhabitants." W. R. Greg, in "Enigmas of Life" (London, 1872), has taken issue with Malthus, and says one influence tending to reduce the rate of increase "may be specified with considerable confidence, namely, the tendency of cerebral development to lessen fecundity," and approvingly quotes Herbert Spencer's views. But he says that some years ago he had hoped to be able to show that Malthus's premises were imperfect and his conclusions in consequence unsound. "It is with sadness," he adds, "I am now compelled to admit that further investigation and deeper thought have shaken this confidence. I now only venture to suggest as eminently probable what I once fancied I could demonstrate to be certain."—Probably no work on political economy has been more extensively read or studied, or has exerted a larger influence in the formation of opinions in the United States at least, than Jean Baptiste Say's "Treatise on Political Economy, or the Production, Distribution, and Consumption of Wealth" (Paris, 1803; 6th ed., 1841). This treatise is in form the most scientific and methodical which at the time of its publication had appeared in any language. "If," says Say, "we take the pains to inquire what that is which mankind in a social state of existence denominates wealth, we shall find the term employed to designate an indefinite quantity of objects bearing inherent value, as of land, of metal, of coin, of grain, of stuffs, of commodities of every description. When its signification is further extended to landed securities, bills, notes of hand, and the like, it is evidently because they contain obligations to deliver things possessed of inherent value. In point of fact, wealth can only exist where there are things possessed of real and intrinsic value. Wealth is proportionate to the quantum of that value; great when the aggregate of component value is great, small when that aggregate is small. . . . The knowledge of the real nature of wealth, thus defined, of the difficulties that must be surmounted in its attainment, of the course and order of its distribution among the members of society, of the uses to which it may be applied, and further, of the consequences resulting respectively from these several circumstances, constitute that branch of science now entitled political economy." Subsequently Say published his lectures on the application of the science, under the title of *Cours complet d'économie politique pratique, suivi de mélanges* (6 vols., Paris, 1828–'30; 3d ed., edited by Horace Say, 1852). An examination of this book will show that he had materially altered his views, and was now disposed to treat political economy as something higher and better than a mere science of wealth. "The object of political economy," he says in this later book, "seems heretofore to have been restricted to the knowledge of the laws which govern the production, distribution, and consumption of riches. And it is so that I have considered it in my treatise upon political economy, published first in 1803; yet in that same work it can be seen that the science pertains to everything in society." In the same year in which Say's first treatise appeared, Sismondi published in Geneva his *Traité de la richesse commerciale*. At this time Sismondi was a decided follower of Adam Smith; "but," says Colwell, "being an ardent friend of humanity, his views underwent a complete change in the progress of his investigations. No more pleasing task could be offered us than turning through the voluminous works of Sismondi for the evidences of his pure love of human welfare, and his detestation of the science of wealth apart from human well-being."—At the request of Alexander I. of Russia H. Storch prepared his *Cours d'économie politique, ou exposition des principes qui déterminent la prospérité des nations* (St. Petersburg, 1815). "The emperor Alexander, having taken his lessons in political economy from M. Storch," says Carey, "determined to carry out in the administration of the empire the lessons he had learned in the closet; but the result proved most disastrous. British goods flowed in in a constant stream, and Russian gold flowed out; and the government was paralyzed, while the manufacturers were ruined. . . . Count Nesselrode issued a circular preliminary to a change of system, in which it was declared that Russia found herself forced to resort to a system of independent commerce; that the products of the empire no longer found markets abroad; that the manufactures of the country were exceedingly depressed; that the coin of the country was rapidly flowing out to distant nations; that the most solid mercantile establishments had become endangered; and that agriculture and commerce as well as manufacturing industry were not only paralyzed, but had been brought to the brink of ruin." In 1824 Russia again imposed heavier duties in opposition to the theories of Storch.—"The Principles of Political Economy and Taxation," by David Ricardo, appeared in London in 1817 (3d ed., 1821). The most noted doctrines of this work are the theory of rent and the consequent theory of value. The former, with which the name of Ricardo is now always associated, was announced in 1777 by James Anderson, a Scotchman, in a tract entitled "An Inquiry into the Nature of the Corn Laws;" and it seems to have been so completely overlooked and forgotten, that "when in 1815," says an English economist, "Mr. Malthus and Sir Edward West published their tracts exhibiting the nature and progress of rent, they were universally believed to have for the first time discovered the laws by which it is governed." The theories of rent and value, abridged from Ricardo's own statement, are as follows: On the first settling of a country in which there is an abundance of rich and fertile land, there will be no rent; for no one would pay for the use of land when there was an abundant quantity not yet appropriated. If all land had the same properties, if it were boundless in quantity and uniform in quality, no charge could be made for its use, unless where it possessed peculiar advantages of situation. It is only then because land is not unlimited in quantity and uniform in quality, and because in the progress of population land of an inferior quality or less advantageously situated is called into cultivation, that rent is ever paid for the use of it. When in the progress of society land of the second degree of fertility is taken into cultivation, rent immediately commences on that of the first quality; and the amount of that rent will depend on the difference in the quality of these two portions of land. When land of the third quality is taken into cultivation, rent immediately commences on the second, and it is regulated as before by the difference in their respective productive powers. At the same time the rent of the land of the first quality will rise, for that must always be above the rent of the second, by the difference between the produce which they yield with a given quantity of capital and labor. "The most fertile and favorably situated land will be first cultivated, and the exchangeable value of its produce will be adjusted in the same manner as the exchangeable value of all other commodities, by the total quantity of labor necessary in various forms, from first to last, to produce it, and bring it to market. When land of an inferior quality is taken into cultivation, the exchangeable value of raw produce will rise, because more labor is required to produce it." "This," says one of Ricardo's followers, "is the fundamental theorem of the science of value, and the clue which unravels the laws that regulate the distribution of wealth." By reason of these theories of rent and value, if in accordance with the facts, the landlord would be enabled to command a steadily increasing rent as the yield per acre declined, until he absorbed the entire product of the land; and food would as steadily increase in cost as population increased. Starvation and wretchedness could not fail to be the lot of the mass of mankind under such a condition of things. These theories seemed to aid in accounting for the Malthusian principle of population, and they at once took their positions as logically anterior to that doctrine, and became the foundation of the system now known as Ricardo-Malthusianism.—In 1825 Samuel Bailey, author of "Essays on the Formation and Publication of Opinions," published "A Critical Dissertation on the Nature, Measure, and Causes of Value," in which he attacked Ricardo's theory of value. In 1821-'2 James Mill published "Elements of Political Economy," which is to some extent a statement and abstract elaboration of some of the doctrines of Adam Smith and Ricardo in regard to production and distribution, and those of Malthus respecting population.—One of the most widely known writers on political economy and statistics for the last generation was J. R. McCulloch, who prepared the article for the supplement to the "Encyclopædia Britannica," a separate edition of which appeared in 1825, and which has since passed through several editions, the last in 1864 under the title of "The Principles of Political Economy, with some Inquiries respecting their Application, and a Sketch of the Rise and Progress of the Science." "McCulloch," says Colwell, "belongs neither to the school of Say, nor to the still more refined and strict school of Tracy, Rossi, and Senior. He persists in considering all the topics of political economy from a practical point of view. He speaks of a science, it is true, but only in that popular sense in which men speak of the science of politics, which is a very different sense from that in which it is employed by Rossi, Senior, and J. S. Mill."—In the "Encyclopædia Metropolitana" in 1835, and subsequently in a separate form, appeared "Political Economy" by Nassau W. Senior, professor in the university of Oxford; the subject being, by the plan of the "Encyclopædia," classed as among the pure sciences. But the author of this treatise failed to confine his investigations strictly within these bounds. "We propose in the following treatise," he says in opening, "to give an outline of the science which treats of the nature, the production, and the distribution of wealth. To that science we give the name of political economy." He insists too on limiting his inquiries to these subjects as the only true and legitimate ones, and adds that political economy does not treat of "happiness, but wealth." He even declines to examine into the effects upon society of the possession of wealth, what distribution is most desirable, or what are the means by which any peculiar distribution can be carried into effect by legislation. All of these questions are "of great interest and difficulty, but no more form part of the science of political economy, in the sense in which we use that term, than navigation forms part of the science of astronomy." The premises of the political economist he regards as consisting "of a few general propositions, the result of observation or consciousness, and scarcely requiring proof or formal statement, which almost every man, as soon as he hears them, admits as familiar to his thoughts, or at least as included in his previous knowledge; and his inferences are nearly as general, and, if he has reasoned correctly, as certain as his premises." The fundamental propositions in political economy Mr. Senior thus states: 1, every man desires to obtain additional wealth with as little sacrifice as possible; 2, the population of the world, or in other words the number of persons inhabiting it, is limited only by moral and physical evil, or by the fear of a deficiency of those articles of wealth which the habits of the individuals of each class of its inhabitants lead them to require; 3, the powers of labor, and of the other instruments which produce wealth, may be indefinitely increased by using their products as the means of further production; 4, agricultural skill remaining the same, additional labor employed on the land within a given district produces in general a less proportionate return; or in other words, though with every increase of the labor bestowed the aggregate return is increased, the increase of the return is not in proportion to the increase of labor. Mr. Senior belonged, as can be seen, to the school of Ricardo and Malthus, and believed with them in the limited powers of the earth, although in reality he took issue with Malthus in the consideration of his theory of population. —No English writer on political economy during the present century has attracted more attention or been regarded as higher authority than John Stuart Mill. He defines it to be "the science which treats of the production and distribution of wealth, so far as they depend upon the laws of human nature; or the science relating to the moral or psychological laws of the production and distribution of wealth." Again he says: "Political economy may be defined as follows, and the definition seems to be complete: The science which traces the laws of such of the phenomena of society as arise from the combined operations of mankind for the production of wealth, in so far as those phenomena are not modified by the pursuit of any other object." Political economy is "essentially an abstract science," and its method "is the *a priori.*" "It reasons," he contends, and "must necessarily reason, from assumptions, not from facts." "The conclusions of political economy, consequently, like those of geometry, are only true, as the common phrase is, in the abstract." "That which is true in the abstract is always true in the concrete with proper allowances." Not only "the method *a priori* is the legitimate mode of philosophical investigation in the moral sciences," but "it is the only mode." The *a posteriori* method, or that of specific experience, "is altogether inefficacious," although it may be "usefully applied in aid of the *a priori.*" Therefore, "since it is vain to hope that truth can be arrived at, either in political economy or in any other department of the social science, while we look at the facts in the concrete, clothed in all the complexity with which nature has surrounded them, and endeavor to elicit a general law by a process of induction from a comparison of details, there remains no other method than the *a priori* one, or that of abstract speculation." "In all the intercourse of man with nature," proceeds Mr. Mill, "whether we consider him as acting upon it or as receiving impressions from it, the effect or phenomenon depends upon causes of two kinds, the properties of the object acting and those of the object acted upon. Everything which can possibly happen, in which man and external things are jointly concerned, results from the joint operation of the law or laws of matter, and the law or laws of the human mind." "There are no phenomena," he continues, "which depend exclusively upon the laws of mind; even the phenomena of the mind itself being partially dependent upon the physiological laws of the body." Mr. Mill acknowledges that "the laws of the production of objects which constitute wealth are the subject matter both of political economy and of almost all the physical sciences;" but he considers that political economy "presupposes all the physical sciences," and adds that "it takes for granted that the physical part of the process takes place somehow." In other words, it matters not to political economy why, how, or under what circumstances these laws of matter operate. Mr. Mill's design in writing his "Principles of Political Economy" was to produce "a work similar in its object and general conception to that of Adam Smith; to exhibit the economical phenomena of society in the relation in which they stand to the best social ideas of the present time." He was a full believer in the views of Locke, Montesquieu, Hume, and Smith in regard to money; in those of Ricardo on rent, and Malthus on population. He combats with much energy "protectionism," but holds that there is one, and only one case, "in which, on mere principles of political economy, protecting duties can be defensible;" that is, "when they are imposed temporarily (especially in a young and rising nation), in hopes of naturalizing a foreign industry, in itself perfectly suitable to the circumstances of the country." Mill was long among the ablest and most distinguished supporters of the wage-fund theory, which, stated by him so lately as May, 1869, in the "Fortnightly Review," is briefly as follows: "There is supposed to be, at any given instant, a sum of wealth which is unconditionally devoted to the payment of wages of labor. This sum is not regarded as unalterable, for it is augmented by saving, and increases with the progress of wealth; but it is reasoned upon as at any given moment a predetermined amount. More than that amount it is assumed that the wages-receiving class cannot possibly divide among them; that amount, and no less, they cannot but obtain. So that, the sum to be divided being fixed, the wages of each depend solely on the divisor, the number of participants." This theory, with Mill as its especial defender, was very vigorously attacked in 1866 by Francis D. Longe, a London barrister, in a pamphlet entitled "A Refutation of the Wage-Fund Theory of Modern Political Economy" (2d ed., 1869). In 1869 W. T. Thornton published a volume "On Labor, its Wrongful Claims and Rightful Dues," in which he also assailed the wage-fund theory, but, as is believed, by no means so ably as Longe had done. Mill, in the magazine article above cited, entirely recanted his belief in the theory, on the ground that Thornton had completely refuted it. But Prof. Cairnes, among other English economists, has refused to accept the acknowledgment of Mill as evidence of the falsity of the theory. A careful examination of this theory will show that it is but an elaboration of the doctrine of Adam Smith quoted above, to the effect that the demand for labor can only increase in proportion to the increase of the "funds destined for the payment of wages."—Among the most prominent of English political economists at the present day is Prof. J. E. Cairnes, whose most elaborate production, "Some leading Principles of Political Economy newly Expounded," was published in 1874. While the author says that it is "an attempt to recast some considerable portion of political economy," he would "be sorry it were regarded as in any sense antagonistic in its attitude toward the science built up by the labors of Adam Smith, Malthus, Ricardo, and Mill." "Nor do the final conclusions which I have reached differ very widely on any important points from those at which they have arrived. The points on which I have ventured to join issue with them are what, in Bacon's language, may be called the *axiomata media* of the science—those intermediate principles by means of which the detailed results are connected with the higher causes, which produce them. If I have not deceived myself, there is in this portion of political economy, as at present generally received, no small proportion of faulty material." Prof. W. Stanley Jevons, M. A., published in 1871 "The Theory of Political Economy," in which he endeavors to construct a theory of the subject on a mathematical or quantitative basis, believing that many of the commonly received theories are perniciously erroneous. He treats political economy as the calculus of pleasure and pain, and he applies the differential calculus to wealth, utility, value, demand, supply, capital, interest, labor, &c. Prof. Henry Fawcett's "Manual of Political economy" (1863), which has passed through several editions, is very decided in its advocacy of Ricardo's theory of rent and Malthus's of population. The book, like almost all of its school, treats solely of a science of wealth. While the author is in the fullest sense of the word a believer in the doctrines of Locke, Montesquieu, and Hume in regard to the effect of the volume of money on prices, he maintains that the use of the various forms of credit and of checks and clearing houses may increase prices in a like manner with an increase in the volume of money. He takes ground against the wisdom and expediency of Sir Robert Peel's bank-charter act. (See BANK.)—Herbert Spencer has projected "Principles of Sociology," as a part of his system of philosophy, the publication of which was begun in 1860. In 1873 he published "The Study of Sociology." "Several years since," says Prof. E. L. Youmans, "Mr. Spencer foresaw the difficulty that would arise in working out the principles of social science, from a lack of the data or facts necessary as a basis of reasoning upon the subject, and he saw that before the philosophy could be elaborated these facts must be systematically and exhaustively collected;" and he quotes Spencer as early as 1859 to show how clearly he then "perceived the nature, diversity, and extent of the facts upon which a true social science must rest."—Almost the entire existing school of English political economists advocate "free trade" as the rule of intercourse between nations. Exceptions may be named in the Rt. Hon. Sir John Barnard Byles, author of "Sophisms of Free Trade and Popular Political Economy" (London, 1849; 9th ed., 1870), and Sir Edward Sullivan, "Protection to Native Industry" (London and Philadelphia, 1870).—Dr. Franklin is the earliest American politico-economic writer of whom we have any record; he published at Philadelphia in 1729 "A Modest Inquiry into the Nature and Necessity of a Paper Currency," of which at a subsequent period he said: "It was well received by the common people in general, but the rich men disliked it, for it increased and strengthened the clamor for more money; and as they happened to have no writers among them that were able to answer it, their opposition slackened, and the point was carried by a majority in the house." This was followed by "Observations concerning the Increase of Mankind and the Peopling of Countries" (1751), other papers on paper money before and during the revolution, and various other productions. In some of these he maintained doctrines partaking somewhat of those of the school of Quesnay; in others he is shown to have presented in advance of Adam Smith views such as were elaborated and brought into prominence by that author. "A Discourse concerning the Currencies of the British Plantations in America, especially with regard to their Paper Money," published in Boston in 1740 and reprinted in Lord Overstone's volume of "Scarce and Valuable Tracts on Paper Currency and Banking" (1857), is a valuable production, evincing much research. In a "Letter from a Gentleman in Philadelphia to his Friend in London," published in 1765, known to have been written by John Dickinson, afterward president of Pennsylvania, and a member of congress during the revolution, the current of trade with the mother country, the extent to which that trade had exhausted the colonies of coin, the importance of an emission of paper money properly secured, the policy of promoting manufactures among themselves, and other questions of this character, are examined. In 1791 appeared in Philadelphia "Political Essays on the Nature and Operations of Money, Public Finances, and other Subjects, published during the American War and continued up to the Present Year," by Pelatiah Webster. These essays are full of facts, figures, and vigorous reasoning. The author was a violent opponent of paper money, and especially of its issue in the manner in which it had been done by the continental congress, almost without limit, and without the necessary taxation to withdraw it from circulation. On Jan. 14, 1790, Alexander Hamilton, the first secretary of the treasury under the federal constitution, presented to the house of representatives a report on finance, which was followed on April 23 by one on duties upon imports; Dec. 13, on public credit; Dec. 14, on a national bank; Jan. 28, 1791, on the establishment of a mint; and Dec. 5, on manufactures. It would be difficult to find, among all the state papers or treatises on political economy which appeared before the close of the 18th century, any productions of this character surpassing these in a thorough knowledge of the subjects, clearness and precision of statement, and logical exactness. The report of Alexander J. Dallas, secretary of the treasury, to the house of representatives, Oct. 17, 1814, on the national finances, and that of Feb. 12, 1816, in regard to a general tariff of duties, are among the able economic state papers which have emanated from this government. The "Addresses of the Philadelphia Society for the Promotion of National Industry" (1819), and "The New Olive Branch" (1820), subsequently with other papers collected and published under the title of "Essays on Political Economy" (1822), by Mathew Carey, dealt almost entirely in facts, figures, and references to history; and thus Carey reached the conviction that "there is a complete identity of interest between agriculture, manufactures, and commerce." The first formal treatise on the subject written in the United States is Daniel Raymond's "Thoughts on Political Economy" (Baltimore, 1820). The author endeavors, and with some success, to escape from the complications and inconsistencies of the economists. His examination of some of the arguments of Adam Smith in regard to stock are original, vigorous, and conclusive. John Rae, a Scotchman, published in Boston in 1834 a "Statement of some New Principles on the subject of Political Economy," which has been quoted and highly commended by John Stuart Mill in his "Principles of Political Economy," and he says of it: "In no other book known to me is so much light thrown, both from principles and history, on the causes which determine the accumulation of capital."—In 1835 appeared at Philadelphia an "Essay on the Rate of Wages," the first of the works of Henry C. Carey. He took ground against regarding political economy as the science of wealth, and insisted upon considering its "great object" and "its chief claim to attention the promotion of the happiness of nations." This was followed by his "Principles of Political Economy" (3 vols., 1837–'40), in which he holds that value is determined by the cost of reproduction, and that every improvement in the mode of producing any commodity tends to lessen the value of commodities of the same description previously existing; that in all advancing countries accumulated capital has a constant tendency to fall in value when compared with labor; labor therefore steadily growing in its power to command capital, and *e converso* the power of capital over labor as steadily diminishing; labor and capital in their combined action continually producing a larger return for the same outlay, of which larger return an increasing proportion goes to the laborer, while the share of the capitalist diminishes in its proportion, but increases in amount, being taken from a larger yield. In 1848 appeared Mr. Carey's work entitled "The Past, the Present, and the Future." Its object was that of demonstrating the existence of a simple and beautiful law of nature in virtue of which the work of occupation and cultivation of the earth had always of necessity begun upon the higher, drier, and poorer lands, passing thence, with the growth of wealth and population, to the lower and richer soils, with constant increase in the return to labor. Here was a complete reversal of the doctrines of Malthus and Ricardo. In his "Principles of Social Science" (3 vols. 8vo, Philadelphia, 1858–'9), he most clearly draws the distinction between the science, which treats of the natural laws governing the subject, and the art, political economy, by means of which the obstructions to the operation of those laws may be removed. He defines his subject as being "the science of the laws which govern man in his efforts to secure for himself the highest individuality and the greatest power of association with his fellow man." The more numerous the differences in the demands of society, the more complete becomes the development of the individualities of its members, the greater is the power of association and combination, the more rapid the progress, and the more perfect the responsibility for the proper use of the faculties which have been developed. Here, as everywhere, it is shown that in variety there is unity, and that the nation which would have peace and harmony at home and abroad must adopt a policy which shall develop the infinitely various faculties of its people—the plough, the loom, and the anvil working together, each for the advantage of the others. The social laws are thus, according to Carey, identical with those which govern matter in all its various forms; differences everywhere exciting forces, forces exciting heat in matter and impulse in mind, and heat and impulse reëxciting motion. Nature's laws being thus universal, the branches of science constitute but one great and harmonious whole, the social parts demanding the same methods of study and investigation. The methodical study of nature does, and of necessity must, take the place of the metaphysical. The third chapter of the book is devoted to an exposition of the great series of changes which the earth must undergo in furnishing the residence and support of vegetable, animal, and human life in the order of their respective appearances upon it, the relation and dependence of their various subsistence upon each other, and the circulation of the common elements of their structure, beginning with the disintegrated rock in its simplest forms, and thence ascending through vegetable and animal organisms to that of man, in which their greatest complexity and highest sphere are reached, and whence they are again set free to pass through that never ending circuit which constitutes the entire organic and inorganic creation, one perfectly balanced system of universal exchange; an incessant flux of the forms of matter in their ascent from the simple to the most complex, adjusted precisely to the growing requirements of the successive orders of being in the great scale of vital development, the higher forms of being never outgrowing or overtopping the lower from which they spring, and to which they must of necessity return. Such are the reciprocities of motion, force, and function, in which Carey finds an order and a system which, as he believes, put to flight the doctrine of discords and disproportions announced by Malthus, and since adopted by so many of the economists of Europe. A chapter on the new doctrine of the occupation of the earth, already referred to, is followed by one devoted to an examination of the question of value. Utility, according to Carey, is the measure of man's power over nature. All the utilities developed centre themselves in man, with constant increase of his power, and as constant decline of values, which are but the measure of nature's resistance to the gratification of man's desires. Wealth consists in man's power to command the always gratuitous services of nature. Production consists in directing the forces of nature to the service of man. Every act of consumption is also an act of production, water being consumed in the production of air, air being consumed in the production of water, both being consumed in the production of plants, which in their turn are consumed in the production of men and animals, all of which are finally resolved into the elements of which they are composed, to go their round again in the reproduction of plants, animals, and men. Capital is the instrument by the aid of which the work is done, whether existing in the form of land and its improvements, ships, ploughs, mental development, books, or corn. Trade is the performance of exchanges for other persons, and is the instrument used by commerce, which consists in the exchange of services, products, or ideas by men with their fellow men. As men are more and more enabled to associate, commerce increases, but the power of trade declines; the growth of the one being here, as in the case of utility and value, in the inverse ratio of the other. Money is regarded as the great instrument of association, power growing everywhere with increase in the ability to command the services of the precious metals. Price is the value of a commodity as measured by money. Prices of land, labor, and all raw materials tend to rise with every increase in the power of association, that increase being attended by decline in the prices of finished commodities. They tend therefore to approximate, and it is in the closeness of that approximation that Carey finds the highest evidence of advancing civilization. In his opinion trade appears first, to be followed by manufactures; and it is not until the latter have been developed, and a market has been thus made in the neighborhood of the farm, that any real agriculture makes its appearance. The more complete the development of diversified industries, including agriculture, the greater is the tendency toward an influx of the precious metals, which like other raw materials tend always toward those places at which finished commodities are cheapest. Circulating notes diminish the value of the precious metals, but increase their utility, with constant diminution in the rate of interest, and equally constant increase in the tendency toward equality among men, and strength in the communities of which they are a part. The power of accumulation is in the direct ratio of the rapidity of the societary movement. Power grows with every increase in the numbers that can obtain food from any given space; and here we reach the law of population propounded by Carey. Agriculture, as has been seen, becomes more productive as men are more and more enabled to combine. The more they can combine, the less is the waste of human power in the search for food, and the less the muscular effort required for producing any given effect; the locomotive of civilized society doing the work that in savage life is done by the shoulders of the man, and the great steam mill grinding the grain that before had required the severest labor. Vegetable food is largely substituted for animal food; the tendency toward this substitution being always greatest in those communities in which growing wealth most manifests itself in the clearing, drainage, and culture of those rich soils which, according to Ricardo, are cultivated when men are poor, weak, and scattered, but which, according to Carey, are last brought under human power, their very wealth forbidding their occupation by the early cultivator. The more perfect the development of the latent powers of the earth, and the greater the development of man's peculiar faculties, the greater is the competition for the purchase of labor, the greater is the freedom of man, the more equitable is the distribution of the products of labor, and the greater is man's feeling of responsibility for his action in the present and of hope in the future. The higher that feeling, the greater the tendency toward matrimony as affording the means of indulging affection for wife and children, and the love of home. The Malthusian theory Carey holds to be irreconcilably inconsistent with the real laws of nature as seen in the occupation of the earth, and the relative powers of increase in vegetable life and in the lower forms of animal life and in man. The sphere of action of government in directing the commerce of the state is strictly limited to the removal of the obstacles to perfect combination and association. Real freedom of trade consists in the power to maintain direct commerce with the outside world. To reach it there must be a diversity of employments, enabling the exporting country to send its commodities abroad in a finished shape. Centralization, such as is established by the British system, is opposed to this, and therefore it is that that system is resisted by all the advancing communities of the world, they being enabled to advance in the precise ratio with their power to resist it. Protection being the form assumed by that resistance, its object may be properly defined as being that of establishing perfect freedom of commerce among the nations of the world. Societary organization furnishes additional evidence of the universality of nature's laws, for throughout her realms dissimilarity of parts furnishes conclusive evidence of the perfection of the whole—the highest organization presenting the most numerous differences. The higher the organization the more complete the subordination of parts, and the more harmonious and beautiful their interdependence; and the more complete that interdependence the greater the individuality of the whole, and the more perfect the power of self-direction. In 1873 Mr. Carey published "The Unity of Law as exhibited in the Relations of Physical, Social, Mental, and Moral Science." The writers who have adopted in whole or in part the doctrines of Carey, and have published books or papers on the subject, are: in the United States, E. Peshine Smith, "A Manual of Political Economy" (1853); Dr. William Elder, "Questions of the Day, Economic and Social" (1870); Robert Ellis Thompson, "Social Science and National Economy" (1875); in Germany, Prof. Eugene Dühring of Berlin, *Carey's Umwälzung der Volkswirthschaftslehre und Socialwissenschaft* (1865), *Capital und Arbeit, neue Antworten auf alte Fragen* (1865), *Die Verkleinerer Carey's und die Krisis der Nationalökonomie* (1867), *Kritische Geschichte der Nationalökonomie und des Socialismus* (1871), and *Cursus der National- und Socialökonomie* (1873); in France, M. de Fontenay, M. Raspail, and M. Clapier; in Italy, Signor Ferrara, late minister of finance and editor of *Biblioteca dell' economista.*—American writers other than those already named are Prof. Francis Bowen, Condy Raguet, Prof. Wayland, Prof. H. Vethake, George Opdyke, Prof. Amasa Walker, Prof. A. L. Perry, and David A. Wells. Prof. Bowen published in 1856 "Principles of Political Economy," which was revised and republished in 1870 under the title "American Political Economy, including Strictures on the Management of the Currency and Finances since 1866." He says with much truth: "The entire science of English political economy may be said to be built upon three leading theories, that of Adam Smith concerning free trade, that of Malthus in regard to population, and that of Ricardo in regard to rent." In none of these does he agree with the English school, although he recognizes that they contain a mixture of truth and falsehood. Condy Raguet was a decided follower of the English school, especially in regard to free trade and the theory of money. Profs. Wayland and Vethake mainly followed the English writers. Mr. Opdyke believes that "free trade, absolute, unconditional free trade, and direct taxation, is the true policy of all nations, and of each nation regardless of the course pursued by all others." He holds that bank deposits payable on demand are money, and is opposed to paper money made convertible with coin, but thinks that the government of the United States should issue inconvertible paper money to the amount of $10 a head of the population, which should circulate in common with coin, each being equally a legal tender. These views were promulgated in 1851 in "A Treatise on Political Economy." In 1866 Dr. Amasa Walker published "The Science of Wealth, a Manual of Political Economy, embracing the Laws of Trade, Currency, and Finance," which has been repeatedly revised and republished. Dr. Walker is a decided adherent of the views of Montesquieu and Hume on money, holds to Ricardo's theory of rent, but not to Malthus's law of population, and is strongly in favor of free trade. Prof. Perry published his "Elements of Political Economy" in 1865, and it has passed through several editions. He regards the "word wealth" as "the bane of political economy," "the bog whence most of the mists have arisen which have beclouded the whole subject." He adds that the definition given by Archbishop Whately, "the science of exchange," or "its precise equivalent, the science of value, gives a perfectly definite field to political economy." Value, he holds, "is always and everywhere the relation between two services exchanged," while utility he regards as the "capacity which anything or any service has to gratify any human desire whatever." In regard to Malthus's law of population, he holds "that the alleged laws of nature in respect to the increase of population and food, which are said to be antagonistic, have never yet been proved." In regard to distribution he says: "I wish at this point to bear testimony to his (Carey's) great merit as the original discoverer of the beautiful law of distribution, in the light of which the future condition of the laboring classes of all countries, if they are only true to themselves, seems hopeful and bright." In regard to the occupation of the earth and to rent, he takes a middle ground between Ricardo and Carey. On the subject of money he is a decided follower of Locke, Montesquieu, and Hume, and upon this and foreign trade is utterly opposed to the doctrines of the mercantile school of former days and the protectionists or the national school of the present. Mr. Wells has principally devoted his attention to the subject of foreign trade, tariffs, and taxation generally, and is fully in accord with the English school of the present time.—The names and doctrines of most of the leading economists of Great Britain and the United States, other than those who confine themselves to the examination of questions of finance and banking, have been already mentioned. In this class Henry Dunning McLeod, Prof. Bonamy Price, R. H. Patterson, and R. H. Inglis Palgrave now hold a prominent position in England. The late Stephen Colwell of Philadelphia published in 1859 (2d ed., 1860) "The Ways and Means of Payment, a full Analysis of the Credit System, with its Various Modes of Adjustment," which is still the most exhaustive examination of this entire field in the English language, giving both his own views and those of his predecessors, and a fuller and more complete statement of moneys of account than any previous writer.—In France, among the more distinguished writers on political economy are Blanqui, Tracy, Louis Say, Droz, Rossi, Chevalier, Dunoyer, Garnier, Baudrillart, Bastiat, Fontenay, Coquelin, Faucher, Reybaud, and Wolowski. One of the most noted of these was Frédéric Bastiat, whose works were published collectively after his death (6 vols., Paris, 1855; new ed., 1862). He was a strong partisan of free trade, and a decided follower of Locke, Montesquieu, and Hume in regard to money, holding that "it is quite unimportant whether there is much or little money in the world. If there is much, much will be used; if there is little, little is required; that is all." His most important work is his *Harmonies économiques* (1850), maintaining the doctrine that "all legitimate interests are harmonious," which he sought to demonstrate by doctrines greatly resembling Carey's theory of value, and the consequent law of distribution, enunciated in 1837. Speaking of the law of distribution, he says: "Thus the great law of capital and labor, as regards the distribution of the products of their joint labors, is settled. The absolute quantity of each is greater, but the proportional part of capital constantly diminishes, as compared with that of labor." It need hardly be added that he took issue with the theories of Ricardo and Malthus. M. Michel Chevalier has principally devoted himself to the questions of policy growing out of international trade, and is a thorough partisan of free trade, having taken a leading part in the reciprocity treaty between Great Britain and France in 1860.—Germany has produced many works on all branches of the subject. The formation of the German *Zollverein* or customs union, establishing entirely free inter-state trade among the states composing it, with such a policy as should protect their domestic production from external disturbance, was due to no man more than to Friedrich List. His "National System of Political Economy" (Stuttgart, 1841; English by G. A. Matile, Philadelphia, 1856) is built upon observation and history. "Nationality," says the English translator, "is the ruling idea of the book; but with his vigorous mind and clear intelligence, he enlarges it until it comprehends every topic of human welfare." "The German eclectic works," says Colwell, "furnish a vast amount of well arranged information, and they may always be consulted with advantage. We would refer," he adds, "especially to the works of Schmalz, Jakob Volgräff, Krause, K. H. Rau, Lotz, Hermann, and Schön; but there are others of equal merit." To these names may be added K. A. Struensee, K. F. Nebenius, J. G. Busch, Schönberg, Wappäus, Schäffle, Scheel, Hermann, Walcker, and Brentano.—In Italy much attention has been given to political economy from an early period, and a collection of Italian economists in 50 vols. 8vo was published at Milan in 1803–'16. The *Biblioteca dell' economista*, another collection of Italian and foreign writers, edited by Francesco Ferrara, professor of political economy in the university of Turin, and an adherent to the school of Adam Smith, has been for several years in course of publication. "In 1764," says Say, "Genovesi commenced a public course of lectures on political economy from the chair founded by the care of the highly esteemed and learned Intieri. In consequence of his example, other professorships were afterward established at Milan, and more recently in most of the universities in Germany and Russia." The disciples of the most recent school of political economy in Italy treat it as a science of observation based on the investigation and study of history and actual life, and reject the notion that it consists simply of deductions from the principle of individual interest. The first number of their monthly periodical, entitled *Giornale degli economisti*, appeared in Padua in April, 1875. Among the leading members of this school are Luzzatti, Lampertico, Forti, and Boccardo.—Among the best books of reference on this subject are: "History of Prices, 1793 to 1856," by Thomas Tooke (6 vols. 8vo, London, 1838–'57), which argues strongly against the theory of the economists in regard to the effect of an increased volume of money on prices, as maintained by Locke, Montesquieu, and Hume; "The Literature of Political Economy," by J. R. McCulloch (London, 1845); *Dictionnaire de l'économie politique* (2 vols. 8vo, Paris, 1852–'3), a most complete, trustworthy, and valuable work; *Histoire de l'économie politique*, by A. Blanqui (4th ed., 2 vols. 12mo, Paris, 1860), containing a *catalogue raisonné* of political economy, which is full and valuable; "A Dictionary of Political Economy, Biographical, Historical, and Practical," by Henry Dunning McLeod (vol. i., London, 1863); "History of Agriculture and Prices in England," by J. E. T. Rogers (2 vols. 8vo, 1866); Dühring, *Kritische Geschichte der Nationalökonomie und des Socialismus* (Berlin, 1871); and Roscher, *Geschichte der Nationalökonomie in Deutschland* (Munich, 1874).

POLIZIANO, Angelo, or **Angelus Politianus,** an Italian poet, born at Monte Pulciano, near Florence, in July, 1454, died in Florence in 1494. He was educated under the auspices of Lorenzo de' Medici, became tutor in his family, published Latin letters in his 13th year and Greek compositions in his 17th, and edited Catullus in his 18th. In 1480 he became professor of Greek and Latin at the lyceum of Florence. He was ill made, and squinted, but was very eloquent. He stands at the head of the classical scholars who contributed to the revival of learning, and was equally distinguished for his Latin and Italian poetry. His works comprise, besides Latin translations from Greek and many editions of classics, the *Miscellanea*, a collection of notes on classic authors (Florence, 1489); *Rime* (1518; new ed., 2 vols., 1816 and 1819); *Orfeo* (best ed., Padua, 1749), the earliest represented secular drama in a modern language; and *Pactianæ Conjurationis Commentariolum* (last ed., Pisa, 1800). His collected works appeared in Basel in 1553. Carducci has published a critical edition of his *Stanze, l'Orfeo e le Rime* (Florence, 1864).

POLK, the name of 12 counties in the United States. **I.** A S. W. county of North Carolina, bordering on South Carolina, and drained by affluents of Broad river; area, about 250 sq. m.; pop. in 1870, 4,349, of whom 978 were colored. The surface is hilly and the soil good, especially along the watercourses. The Blue Ridge mountains are on the W. border. The chief productions in 1870 were 8,808 bushels of wheat, 3,696 of rye, 117,060 of Indian corn, and 5,937 of oats. There were 358 horses, 2,400 cattle, 1,851 sheep, and 4,975 swine. Capital, Columbus. **II.** A N. W. county of Georgia, bordering on Alabama and drained by the Tallapoosa and other streams; area, about 500 sq. m.; pop. in 1870, 7,822, of whom 2,578 were colored. It has an undulating surface and a light sandy soil. The Selma, Rome, and Dalton railroad crosses the N. W. corner. The chief productions in 1870 were 45,497 bushels of wheat, 126,750 of Indian corn, 23,410 of oats, 36,820 lbs. of butter, and 2,001 bales of cotton. There were 463 horses, 788 milch cows, 1,802 other cattle, 1,916 sheep, and 4,407 swine. Capital, Cedartown. **III.** A central county of the peninsula of Florida, bounded S. E. by Kissimee river and lake, and drained by Pease creek; area, 1,944 sq. m.; pop. in 1870, 3,169, of whom 482 were colored. It contains numerous small lakes. The surface is low and the soil moderately productive. The chief productions in 1870 were 97,225 bushels of Indian corn, 37,470 of sweet potatoes, 346 bales of cotton, and 14,200 lbs. of rice. There were 417 horses, 525 mules and asses, 21,648 cattle, and 8,460 swine. Capital, Pease Creek. **IV.** A S. E. county of Texas, intersected by Trinity river; area, 1,188 sq. m.; pop. in 1870, 8,707, of whom 4,298 were colored. Its surface is nearly level, and the soil along the Trinity very fertile. The chief productions in 1870 were 206,328 bushels of wheat, 45,151 of sweet potatoes, 4,548 bales of cotton, 33,865 lbs. of butter, and 17,869 gallons of molasses. There were 1,856 horses, 644 mules and asses, 3,492 milch cows, 1,234 working oxen, 8,721 other cattle, 1,900 sheep, and 15,154 swine. Capital, Livingston. **V.** A W. county of Arkansas, bordering on Indian territory, watered by the Washita and several branches of Red river; area, about 1,000 sq. m.; pop. in 1870, 3,376, of whom 45 were colored. It has a hilly surface and a generally fertile soil. The chief productions in 1870 were 75,883 bushels of Indian corn, 5,849 of oats, 7,713 of sweet potatoes, and 259 bales of cotton. There were 611 horses, 747 milch cows, 1,665 other cattle, 1,267 sheep, and 5,849 swine. Capital, Dallas. **VI.** A S. E. county of Tennessee, bordered E. by North Carolina and S. by Georgia, and drained by the Hiawassee river and one of its branches, the Tocoa or Ocoee; area, about 300 sq. m.; pop. in 1870, 7,369, of whom 313 were colored. It has a mountainous surface and a moderately fertile soil, and contains copper mines. The chief productions in 1870 were 35,726 bushels of wheat, 152,425 of Indian corn, 17,192 of oats, 5,244 lbs. of tobacco, 10,429 of wool, 45,659 of butter, and 10,173 gallons of sorghum molasses. There were 715 horses, 1,057 milch cows, 1,814 other cattle, 4,642 sheep, and 5,537 swine. Capital, Benton. **VII.** A N. W. county of Wisconsin, separated from Minnesota on the west by the St. Croix river, and drained by several streams; area, about 900 sq. m.; pop. in 1870, 3,422. The chief productions in 1870 were 41,029 bushels of wheat, 10,889 of Indian corn, 52,564 of oats, 3,097 tons of hay, and 68,208 lbs. of butter. There were 976 horses, 834 milch cows, 1,267 other cattle, 745 sheep, and 914 swine. Capital, Osceola Mills. **VIII.** A N. W. county of Minnesota, separated from Dakota by the Red river; area, about 4,500 sq. m.; returned as having no population in 1870. It is drained by Red Lake and Wild Rice rivers and other affluents of the Red. The valleys contain good farming lands. **IX.** A central county of Iowa, intersected from N. W. to S. E. by the Des Moines river, and across the N. E. by the Skunk river, and watered also by the Raccoon and other branches of the Des Moines; area, 720 sq. m.; pop. in 1870, 27,857. It has a rolling surface and fertile soil. The Chicago, Rock Island, and Pacific and the Des Moines Valley railroads pass through the county. The chief productions in 1870 were 366,423 bushels of wheat, 1,779,875 of Indian corn, 176,899 of oats, 17,253 of barley, 132,172 of potatoes, 382,606 of butter, 15,992 of wool, and 25,538 tons of hay. There were 6,726 horses, 5,818 milch cows, 5,695 other cattle, 9,032 sheep, and 28,626 swine; 3 manufactories of agricultural implements, 12 of carriages and wagons, 3 of iron castings, 5 of machinery, 11 of saddlery and harness, 2 of woollens, 1 pork-packing establishment, 2 bookbinderies, and 6 flour mills. Capital, Des Moines, which is also the capital of the state. **X.** A S. W. county of Missouri, watered by affluents of the Osage river; area, 750 sq. m.; pop. in 1870, 12,445, of whom 259 were colored. The surface is undulating or level, and the soil fertile. The chief productions in 1870 were 117,999 bushels of wheat, 552,612 of Indian corn, 155,661 of oats, 26,925 of potatoes, 3,406 tons of hay, 11,610 lbs. of tobacco, 32,957 of wool, 150,221 of butter, and 21,631 gallons of sorghum molasses. There were 5,433 horses, 1,092 mules and asses, 4,055 milch cows, 875 working oxen, 6,170 other cattle, 16,681 sheep, and 22,411 swine. Capital, Bolivar. **XI.** An E. central county of Nebraska, bounded N. W. by the Platte river, and intersected by the N. fork of the Big Blue; area, about 400 sq. m.; pop. in 1870, 136. The surface consists mostly of rolling and productive prairies. The chief productions in 1870 were 1,509 bushels of wheat, 1,540 of Indian corn, 450 of oats, 530 of potatoes, and 75 tons of hay; value of live stock, $11,315. Capital, Osceola. **XII.** A W. county of Oregon, bounded E. by the Willamette river and W. by the Coast mountains, and watered by La Creole and other rivers; area, 900 sq. m.; pop. in 1870, 4,701. The surface is diversified and the soil generally fertile. The chief productions in 1870 were 303,338 bushels of wheat, 199,405 of oats, 22,953 of potatoes, 55,208 lbs. of wool, 142,778 of butter, and 6,128 tons of hay. There were 3,863 horses, 3,092 milch cows, 4,411 other cattle, 16,046 sheep, and 12,380 swine; 5 manufactories of saddlery and harness, 1 of woollens, 1 flour mill, and 4 saw mills. Capital, Dallas.

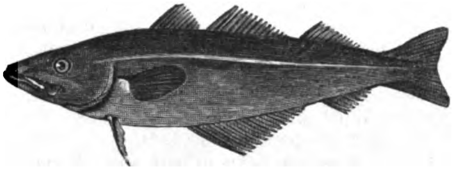
POLK, James Knox, the eleventh president of the United States, born in Mecklenburg co., N. C., Nov. 2, 1795, died in Nashville, Tenn., June 15, 1849. His ancestors, whose name was originally Pollock, emigrated from Ireland early in the 18th century. His father was a farmer, who in 1806 removed to the valley of Duck river in Tennessee. The son received at first a scanty education, but finally entered the university of North Carolina, graduated in 1818, and was admitted to the bar in 1820. In 1823 he was chosen to the state legislature. In 1825 he was elected to congress, and soon became a conspicuous opponent of the administration of John Quincy Adams, and was afterward one of the most efficient supporters of Jackson. He was nominated for speaker by the democratic party near the close of the session of 1834, but was defeated by a coalition between the whigs and a portion of the democrats in favor of John Bell. In 1835 Mr. Polk was elected speaker, and he was reëlected in 1837. In 1839, having served for 14 years in congress, he declined a reëlection, and was chosen governor of Tennessee. In 1840 he received the nomination of the legislature of Tennessee and several other states for vice president with Mr. Van Buren, but at the election received only one electoral vote, Richard M. Johnson of Kentucky being the regular democratic candidate. In 1841, being renominated for governor, he was defeated by a majority of 3,224 votes. The democratic national convention which met at Baltimore May 27, 1844, nominated him for president on the ninth ballot, George M. Dallas of Pennsylvania being nominated for vice president. Henry Clay and Theodore Frelinghuysen were the candidates of the whig party. Mr. Polk was elected by a popular vote of 1,337,243 to 1,299,062 for Clay and 62,300 for James G. Birney, the anti-slavery candidate. The annexation of Texas, the most exciting question in the canvass, was effected before Mr. Polk's inauguration. His cabinet consisted of James Buchanan of Pennsylvania, secretary of state; Robert J. Walker of Mississippi, secretary of the treasury; William L. Marcy of New York, secretary of war; George Bancroft of Massachusetts, secretary of the navy till Sept. 9, 1846, afterward John Y. Mason of Virginia; Cave Johnson of Tennessee, postmaster general; John Y. Mason, Nathan Clifford of Maine, and Isaac Toucey of Connecticut, successively attorneys general. At the beginning of his administration the president sent Gen. Taylor with a small force to occupy the country between the Nueces and the Rio Grande, the United States claiming the latter river as their boundary, while the Mexicans maintained that Texas had never extended beyond the Nueces. The question of the boundary of Oregon also engaged the attention of the president. Mr. Polk in his inaugural address had declared that "our title to the country of the Oregon was clear and unquestionable." After negotiation, however, the president directed the secretary of state to offer as the boundary the parallel of 49°, instead of 54° 40′, which had previously been insisted upon; this was accepted by Great Britain, the proposition being so far modified as to give to that power the whole of Vancouver island. In April, 1846, hostilities broke out on the Rio Grande between Gen. Taylor's army and that of the Mexican commander, Gen. Arista. The president sent a message to congress declaring that "war existed by the act of Mexico," and asking for men and money to carry it on. Congress responded, May 11, by an appropriation of $10,000,000 and giving authority to call out 50,000 volunteers. The war was prosecuted with energy, and resulted in the conquest of Mexico, the city of Mexico itself being occupied by the American forces on Sept. 14, 1847. Mexico ceded to the United States New Mexico and Upper California, and accepted the Rio Grande from its mouth to El Paso as the southern boundary of Texas. In the election of 1848 Mr. Polk was not a candidate, having in 1844 pledged himself not to seek a renomination, and his administration terminated March 4, 1849. The chief measures which distinguished it, besides those already mentioned, were the adoption of the low tariff of 1846, replacing the protective one of 1842; the establishment of the independent treasury system, by which the revenues of the government are collected in specie without the aid of banks; the creation of the department of the interior; and the admission of Wisconsin as a state of the Union. Three months after his retirement Mr. Polk was seized with illness, and in a few days died. He was of middle stature, with a full, angular brow, and quick, penetrating eyes. He was grave but unostentatious and amiable, and his private character was pure and upright.

POLK, Leonidas, an American clergyman, subsequently a general in the confederate army, born in Raleigh, N. C., in 1806, killed at the battle of Pine Mountain, near Marietta, Ga., June 14, 1864. He graduated at the military academy of West Point in 1827, and was appointed brevet second lieutenant of artillery, with leave of absence. He resigned his commission Dec. 1, 1827, studied theology, and in 1830 was ordained as deacon in the Protestant Episcopal church, and in the following year as priest. In 1838 he was made missionary bishop of Arkansas, with the provisional charge of the dioceses of Alabama, Mississippi, and Louisiana, having also supervision of the missions in Texas. In 1841 he was chosen bishop of Louisiana. On the breaking out of the civil war he entered the confederate military service with the rank of major general, and was placed in command of the district on both sides of the Mississippi from the mouth of the Arkansas to Paducah on the Ohio. Several important works were here constructed under his direction, among which were Forts Donelson and Henry. In the spring of 1862 he was sent to join the army under Gen. A. S. Johnston, and he commanded a division at the battle of Shiloh. He afterward served under Gen. Bragg in Kentucky and Tennessee, being present at the battles of Perryville, Murfreesboro, and Chickamauga. In the last engagement Bragg charged him with disobedience of orders, and he was temporarily relieved from command and placed under arrest. In the spring of 1864, having been made a lieutenant general, he was placed in temporary control of the confederate department of the Mississippi, which he conducted with great skill, and was soon placed in command of one of the three corps in the army of Gen. J. E. Johnston. He was prominent in the early operations of the Atlanta campaign. While reconnoitring the position of a Union battery, he was killed by a cannon shot. He had never resigned his bishopric.

POLKA (supposed to be derived from Bohem. *pulka*, half), a dance first known in eastern Bohemia, introduced in 1835 at Prague, and performed by Raab, a Bohemian dancing master, at the Odeon theatre in Paris in 1840. It is danced by two persons, advancing together, or whirling as in the waltz. The measure is in $\frac{2}{4}$ time, and the step is elevated, the foot being set down suddenly and almost stamping. There are various modifications of it.

POLKO, Elise, a German novelist, born in Minden, Westphalia, Jan. 31, 1823. She is the daughter of the educator Johann Karl Christoph Vogel, and a sister of the African traveller Eduard Vogel, whose biography she published in 1863. She established her reputation by *Musikalische Märchen* (Leipsic, 1852; new series, 1859–'71). Among her subsequent works are: *Ein Frauenleben* (1854); *Sabbatfeier* (1858); *Aus der Künstlerwelt* (1858–'63); *Faustina Hasse* (1860; new ed., 1870); *Neue Novellen* (14 vols., 1861–'73); *Die Bettleroper* (1864); *Schöne Frauen* (1865–'9); *Erinnerungen an Felix Mendelssohn-Bartholdy* (1868; English translation by Lady Wallace, London, 1869); *Eine deutsche Fürstin, Pauline zur Lippe* (1870); *Plaudereien* (1872–'8); and *Aus dem Jahre* 1870 (1873).

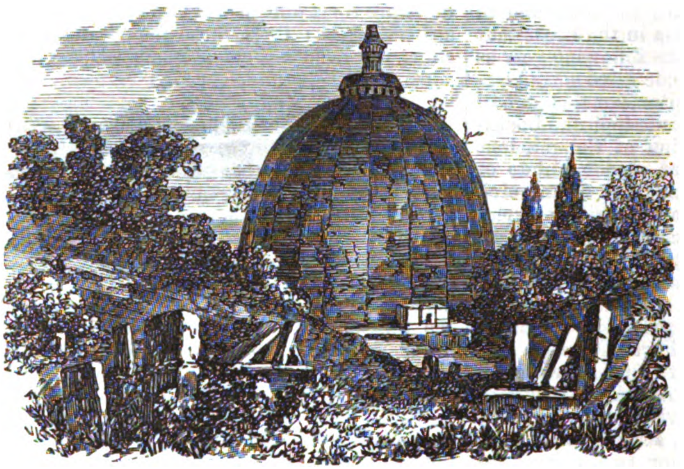
POLLACK, a northern fish of the cod family, and genus *merlangus* (Cuv.). As in the cod, there are three dorsals and two anals, but these are triangular; there is no barbel under the chin; the head is more pointed, and the body more compressed and deeper; the gape large; the tongue fleshy and dark-colored, and the lower jaw the longer; minute teeth in both jaws, but only one row in the lower. The common pollack (*M. purpureus*, Storer) is from 1 to 3 ft. long; the head and body above are greenish brown, the sides lighter, and the abdomen white; some smaller specimens are darker above and reddish below; the ventrals white, anals marked with the same, and the other fins like the back. It is caught abundantly on the New England coast in spring and autumn; its flesh is rather soft, though delicate and nutritious, and is prepared in the manner of dun fish. The pollack of Europe (*M. pollachius*, Cuv.) is olive brown above the lateral line, on the sides dull silvery white mottled with yellow, and whitish below; dorsals and tail brown, the other fins edged with reddish orange. It abounds in the northern seas, especially on rocky coasts, and is esteemed as food; it is voracious like the rest of the family, eating the fry of other fish, mollusks, crustaceans, and radiates; it is gregarious when in pursuit of food. The black pollack (*M. carbonarius*, Linn.), or the coal fish, is from 1 to 3 ft. long, black above, bluish white below the lateral line, and lighter on the abdomen; the lateral line silvery white. It is found from the coast of New York to Davis strait on the American side, and in the northern seas as



Pollack (Merlangus purpureus).

high as Spitzbergen, in the Baltic, and about the Orkneys in Europe. It attains a weight of 30 lbs.; it swims rapidly, not very deeply, and is in the best condition from October to December, when it readily takes the hook.

POLLANARRUA, a ruined city of Ceylon, once the capital of the kingdom, situated in lat. 8° N., lon. 81° E., about 60 m. N. N. E. of Candy. The city stood on the banks of an immense artificial tank or lake, but the waters are now shrunk into a small area, and the grand embankment encloses a broad savannah, beyond which the remains of palaces and temples tower above the highest trees. The principal ruins extend nearly N. and S. for about a mile and a half, and consist of the Gal Vihara, a rock-cut temple containing a seated figure of Buddha; the Jayta-wanarama temple, 170 ft. long by 70 wide, and containing an erect statue of Buddha 58 ft. high; the Rankot dagoba, a circular mass of solid brick masonry, 186 ft. in diameter and about 200 ft. high; the Sat-mahal-prasada, a seven-storied pyramidal temple, in front of which lies a monolith 26 ft. long, 4 ft. wide, and 2 ft. thick, with an inscription, engraved about A. D. 1196, recording that it was brought from the mountain of Mihintala, 80 m. distant; and the palace. The jungle around is filled with mounds of brick, fallen columns, sculptured stones, and the foundations of overthrown buildings. Pollanarrua was made the capital of Ceylon by Mahindo I., A. D. 769, when Anarajapoora, the former capital, had become untenable from the incursions of the Malabars. In the reign of Prakrama Bahu I., who surrounded it with walls and greatly enriched it, it is said to have covered an area 30 m. long by 4 m. broad. In 1204 it was sacked for the second time by the Malabars. In 1235 the capital was removed to Dambedenia, and the city gradually fell into decay. Neither the Portuguese nor the Dutch knew of these ruins. They were first visited by Mr. Fagan, an Englishman, in 1820. The site is now called Toparé, probably a corruption of Topa-weva, the name of the great tank.



Ruins of Pollanarrua.

POLLEN. See PLANT, vol. xiii., p. 587.

POLLET, Joseph Michel Ange, a French sculptor, born in Palermo in 1814. He studied in Italy and Belgium, and in 1844 settled in Paris. His principal works are "Esmeralda," "The Duke of Brabant at Brussels," and a colossal bust of "France." His "Hour of the Night," at St. Cloud, has been frequently reproduced.

POLLIO, Caius Asinius, a Roman general, born in 76 B. C., died A. D. 4. He was descended from an obscure family of the Marrucini, and is first spoken of at the age of 22 as the accuser of C. Cato, who was acquitted through the influence of Pompey. When the civil war broke out he joined the party of Cæsar, and was with that commander at the passage of the Rubicon and his subsequent march through Italy. Afterward he was sent to Sicily under Curio, who commanded the forces which drove M. Cato out of that country; and when Curio, having crossed into Africa, was defeated and slain by Juba, Pollio collected the scattered troops and joined Cæsar. He was at the battle of Pharsalia in 48, and probably in the following year, on his return to Rome, was elected tribune of the people. In 46 and 45 he accompanied Cæsar in his African and Spanish campaigns, and subsequently was sent into Further Spain to carry on the war against Sextus Pompey. After Octavius had united with Lepidus and Antony in forming the first triumvirate, Pollio joined their party, and was nominated by them for consul in 40. When the division of the provinces was made, Antony assigned to him Transpadane Gaul with the duty of distributing the lands among the veterans. In 39 he made a successful campaign against the Parthini, an Illyrian people, and had the honor of a triumph. He devoted himself thereafter to literature. Among the few preserved fragments of his writings are three letters to Cicero. He wrote a history of the civil war in 17 books, beginning with the year 60 B. C., and apparently extending down to the battle of Actium. He also wrote tragedies. He was a friend of Virgil and Horace, and established the first public library in Rome with the money procured in his Illyrian campaign.

PÖLLNITZ, Karl Ludwig von, baron, a German writer of French memoirs, born near Cologne, Feb. 25, 1692, died in Berlin, June 23, 1775. He was highly educated, and was attached successively to the service of the Prussian kings, the dowager duchess of Orleans, the pope, the duke of Brunswick, the king of Spain, and various petty sovereigns, and finally became grand master of ceremonies under Frederick the Great. In 1744 Frederick gave him a whimsical parting testimonial, but subsequently employed him again in the subaltern office of chamberlain, and made him director of theatres and member of the academy. He changed his religion a number of times. Frederick wrote to Voltaire that "Pöllnitz died as he had lived, swindling the very night before his decease;" and Carlyle says that "Frederick was always rather kind to the poor old dog, though bantering him a good deal." He wrote exclusively in French, and acquired celebrity by his *Mémoires* (3 vols., Liége, 1734), *Nouveaux mémoires* (2 vols., Amsterdam, 1737; republished together with the preceding work, 5 vols., London, 1747), and by other records of his experiences at the courts and of his adventures. His authorship of the anonymous *La Saxe galante* (1737) is contested.

POLLOCK (a fish). See Pollack.

POLLOCK. I. Sir George, an English soldier, born in London in 1786, died at Walmer, Oct. 6, 1872. He was the son of a saddler, and was educated at Woolwich. In 1802 he entered the army of the East India company as a lieutenant of the Bengal artillery. In 1841 he was made major general, and in 1842 received the command of the British troops against the Afghans. He forced the Khyber pass at the end of March, and on Sept. 15, after several battles, became master of Cabool. In 1843 he was envoy in Oude. After his return to London he received the freedom of the city and other marks of distinction, and a pension of £1,000 from the East India company, of which he was a director for two years. He was brevetted field marshal in June, 1870, made constable of the tower of London in December, 1871, and a baronet in March, 1872. **II. Sir Frederick,** an English jurist, brother of the preceding, born Sept. 23, 1783, died Aug. 23, 1870. He graduated at Cambridge in 1806, was called to the bar, and attained a wide reputation. He was attorney general in 1834–'5, and again from 1841 to 1844, and lord chief baron of the court of exchequer from 1844 to 1866, when he retired and was created a baronet.

POLLOK, Robert, a Scottish author, born at Muirhouse, Eaglesham parish, Renfrewshire, in 1799, died near Southampton, Sept. 15, 1827. He graduated at the university of Glasgow, studied theology there, and became a licentiate of the United Secession church in 1827. While a student he published anonymously three prose tales, "Helen of the Glen," "Ralph Gemmell," and "The Persecuted Family," which were republished collectively under the title "Tales of the Covenanters" (Edinburgh, 1833; new ed., 1867). His reputation rests upon "The Course of Time," a long poem in blank verse (1827), which has enjoyed immense popularity, quite as much for its religious sentiments as for its poetical merits. Some portions of the closing books were written at the rate of 1,000 lines a week. The 78th thousand was issued in Edinburgh in 1868, and more than 20 editions have appeared in the United States. Pollok was about to embark for Italy, for his health, when he died. His life was written by his brother (Edinburgh, 1843).

POLLUX. See Castor and Pollux.

POLLUX, Julius. I. A Greek grammarian and sophist, born at Naucratis in Egypt, flourished about A. D. 183. He studied at Athens, where subsequently he taught grammar and rhetoric. His only extant work is the *Onomasticon*, a dictionary of Greek words classified according to their subjects, with definitions and illustrative quotations from the ancient writers. The first edition was published in Venice (1502); subsequent editions are by Hemsterhuys, with a commentary (2 vols. fol., Amsterdam, 1706), Dindorf (5 vols. 8vo, Leipsic, 1824), and Bekker (Berlin, 1846). Kirchhoff's dissertation on Pollux (Berlin, 1874) is valuable. **II.** A Byzantine author, who wrote a universal history, beginning with the creation of the world, and extending to the reign of Valens; one manuscript is said to continue the narration to the death of Romanus II. (963). It is a compilation, and is devoted chiefly to ecclesiastical history. There are editions by Bianconi (fol., 1779) and Hardt (8vo, 1792).

POLO, Marco, a Venetian traveller, born about 1254, died about 1324. His father Nicolò and his uncle Maffeo sailed shortly before Marco's birth on a trading voyage to Constantinople, there exchanged their merchandise for jewels, crossed the Black sea to the Crimea, and travelled overland to Bokhara, where they passed several years. Thence they went to Cathay, where Kublai Khan treated them with great honor, and intrusted them with an embassy to the pope. Reaching Italy after 19 years' absence, they found the papal chair vacant, and after waiting two years for a new pontiff to be chosen, they set out for the East again in 1271, accompanied by Marco. They passed through Palestine, and at Ptolemais (St. Jean d'Acre) met the newly elected pope, Gregory X., who gave them presents and letters for the khan. Traversing the northern part of Persia, they journeyed by the city of Balkh and visited many parts of Tartary; but as they followed no direct track, it is impossible to describe their route. In Badakhshan Marco fell sick, and the party were detained a year. Resuming their journey toward the northeast, they proceeded to Kashgar, Yarkand, and Khoten, and reached the city of Lop or Lok on the borders of a great desert of the same name (the desert of Gobi). Crossing this desert, they arrived at Shatchen in Tangut, travelled to the city of Karakorum, and when in 1275 they came within 40 days' journey of Cambalu (probably Peking), the capital of Cathay, they were met by an escort and conducted to the imperial city. The khan appointed Marco to an office about his person, and subsequently despatched him on embassies to neighboring chiefs, which he conducted with such prudence that he rapidly rose to higher distinctions. The northern provinces of China, eastern Thibet, the city of Lassa, and the province of Khorasan were successively visited by Marco, who generally found the khan's favor a passport to the most secret and sacred places. In southern China he saw the capital Kinsai, with its vast parks, gardens, market places, and open spaces, which is probably the modern town of Hangchow. For three years Marco filled the office of governor of a large city in this part of the empire, and his father and uncle had meanwhile made themselves useful to the khan by instructing him how to make catapults and by other services; so that when the three Venetians asked leave to revisit their native country Kublai at first refused, but finally dismissed them loaded with wealth and promising to return. They accompanied a Persian embassy which had just obtained the daughter of Kublai Khan for their king, and, being unable on account of war to travel by land, sailed in a fleet of 14 ships of four masts. They touched at Borneo, Sumatra, the Nicobar and Andaman islands, Ceylon, and the Carnatic, proceeded up the Persian gulf, landed the princess (1292), and were magnificently entertained by the government for nine months. They then went by land through Kurdistan and Mingrelia to Trebizond on the Black sea, and taking ship arrived at Venice in 1295. Bronzed by the sun, dressed like Tartars, and speaking their native language with difficulty, it was long before they could persuade their friends of their identity. To convince them, they invited all their old associates to a magnificent entertainment, and received them in gorgeous oriental dresses of crimson satin. Putting these off after the guests were seated, they appeared handsomely clad in crimson damask, which was exchanged after the first course for rich suits of crimson velvet. At the end of dinner they were seen in the ordinary garb of the time, and the discarded dresses were divided among the guests. When the cloth was removed Marco exhibited the coarse Tartar garments which they had worn on their travels, and ripping them open took out a profusion of jewels. They were now overwhelmed with distinctions, and received every mark of respect except having all their stories believed. Even on his deathbed Marco was urged to retract his alleged falsehoods; but he solemnly reaffirmed all his statements, and there is now no doubt that he spoke substantially the truth. He was the first to make known to Europeans the existence of Japan. Maffeo became one of the principal magistrates of Venice. Marco was put in command of a galley in the fleet sent against the Genoese, off the coast of Dalmatia, was wounded in the ensuing engagement and carried prisoner to Genoa, and after four or five years' detention was liberated and returned to Venice, where he married and had two daughters. During his captivity he dictated to a fellow prisoner the account of his travels, which was finished in 1298. It was probably written and first published in French, and translated into Latin during Marco's lifetime; but it is impossible to determine which of the several discrepant texts in French, Italian, and Latin deserves the name of original. The French and Latin were published by the Paris society of geography in 1824, and the French, after three inedited manuscripts in the national library at Paris, with explanatory notes and commentary, by Guillaume Pauthier, in 1865 (2 vols. large 8vo). The work has appeared repeatedly in all the principal European languages. One of the best English versions is Marsden's, published with notes and commentaries in Bohn's "Antiquarian Library." The latest English version is "Book of the Kingdom and Marvels of the East," new translation and notes by Col. H. Yule (2 vols. 8vo, London, 1871; revised ed., much enlarged, 1875).

POLOTZK, a town of Russia, on the Dūna, in the government and 60 m. N. W. of the town of Vitebsk; pop. in 1867, 11,418. It has a castle and other feeble fortifications, Greek and Catholic churches, a district school for the nobility, a convent and college formerly belonging to the Jesuits, and some trade in flax and hemp. A United Greek bishop resides here. It is of great antiquity, and was once the capital of a duchy of White Russia, extending along the two banks of the Dūna. Ivan the Terrible of Russia wrested it in 1564 from Lithuania. Stephen Báthory, king of Poland, reconquered it in 1579. In 1772 it was finally incorporated with Russia. In 1839 a large synod assembled here by the emperor Nicholas declared the return of some millions of United Greeks to the Orthodox Greek church.

POLTAVA, or **Pultowa.** **I.** A government of European Russia, in Ukraine, bordering on Tchernigov, Kursk, Kharkov, Yekaterinoslav, Kherson, and Kiev; area, 19,265 sq. m.; pop. in 1870, 2,102,614. The surface is an almost unbroken plain, which declines gradually to the southwest, where the Dnieper flows along the frontier for upward of 200 m., and receives the entire drainage by several rivers, the most important of which are the Sula and Vorskla. Potters' clay, lime, chalk, and saltpetre are the most valuable minerals. The soil is remarkably fertile, and it is one of the best cultivated portions of the empire. The principal crops are barley, oats, wheat, buckwheat, and millet. Large numbers of cattle and sheep are reared. Bee culture is an important industry. The manufactures are limited, and consist chiefly of woollen goods, leather, and brandy. **II.** A city, capital of the government, near the junction of the rivers Poltavka and Vorskla, 445 m. S. S. W. of Moscow; pop. in 1867, 31,852. Is is surrounded by a wall and defended by a citadel near the centre of the town. It has a cathedral, 11 churches, a convent, and a school for cadets. The streets are broad and well laid out, and there is a large square in which is a column commemorating the great battle (July 8, 1709) in which the Swedes were totally routed. (See CHARLES XII.) A mound 40 ft. high, surmounted by a cross, marks the battle field 4 m. S. W. of the city. Poltava has considerable trade, and is connected by rail with Moscow, St. Petersburg, and Odessa.

POLYANTHUS. See PRIMROSE.

POLYBIUS, a Greek historian, born probably about 204 B. C., died about 122. His father was Lycortas of Megalopolis, one of the chief men of the Achæan league, who after the death of Philopœmen became its head. In the war between the Romans and Perseus of Macedon Polybius favored a neutral policy; but when the league decided to offer assistance to the Romans, he was appointed strategus of the cavalry, and sent to Macedonia to communicate the determination to the Roman consul. The offer was declined, but after the defeat of Perseus at Pydna, Caius Claudius and Cneius Dolabella came to the Peloponnesus as commissioners on the part of Rome, and by their orders 1,000 Achæans, among whom was Polybius, were carried to Italy to be tried for the crime of not having aided the Romans against the Macedonians. On their arrival in 167 they were distributed throughout the principal towns of Etruria; but through the influence of Fabius and Scipio, the sons of Paulus Æmilius, Polybius was permitted to dwell in their father's house at Rome, and a strong friendship sprang up between the historian and Scipio, then about 18 years old. After 17 years' detention the Roman senate granted the exiles leave to return, and Polybius accompanied the 300 survivors to their native country. There all his efforts were employed against the party who were endeavoring to foment a war with the Romans; but his advice was disregarded, and on a statue erected to his memory was the inscription that "Hellas would have been saved if the advice of Polybius had been followed." He joined Scipio in the third Punic war, and was present at the destruction of Carthage, hastened to the Peloponnesus after the reduction of Corinth by the Romans, and did so much to mitigate the severity of the victors, that statues in his honor were erected at Megalopolis, Mantinea, Tegea, and other cities. But little is known of the rest of his life. It has been surmised that he was at the capture of Numantia by Scipio in 133, as according to Cicero he wrote a history of the Numantine war. He also wrote a life of Philopœmen, a treatise on tactics, and another on the equatorial regions. His great work is his history, which consisted of 40 books, giving an account of the growth of the Roman power from 220 B. C., where the histories of Timæus and Aratus of Sicyon left off, to 146, the year of the destruction of Corinth. The first two books comprise an introductory history of Rome from the capture of the city by the Gauls to the beginning of the second Punic war, and the first part ends with the conquest of Perseus and the downfall of Macedon. The second part reviews the Roman policy, and carries on the narration of events to the downfall of Grecian liberty. Only five books remain entire, but fragments of the rest are still extant. The five books were first printed at Rome in 1473, in a Latin translation. In 1609 Casaubon printed at Paris an edition, in which all the fragments up to that time discovered were incorporated. The edition of Schweighäuser (8 vols. 8vo, Berlin, 1789–'95) contains a Latin translation and a valuable *Lexicon Polybianum*. The text of this edition was reprinted at Oxford in 1823 in 5 vols. 8vo, with the lexicon. The last edition is that of Bekker (2 vols. 8vo, Berlin, 1844), who added the fragments discovered by Cardinal Mai in the Vatican library at Rome. The best English translation of Polybius is by Hampton (2 vols. 4to, 1772).

POLYCARP, one of the early Christian fathers, born of a Christian family probably in Smyrna soon after the middle of the 1st century, put to death in 168 or 169. He was educated at the expense of Callisto, a noble Christian lady of Smyrna, and became a disciple of St. John the evangelist, who on the death of Bucolus consecrated him to the bishopric of his native city. During the controversy about the celebration of Easter he went to consult Anicetus, bishop of Rome, against whom he defended the practice of the eastern church; and he distinguished himself while at Rome by his opposition to the Marcian and Valentinian heresies. During the persecution under Marcus Aurelius he was brought before the Roman proconsul at Smyrna, and when urged to curse Christ, he replied: "Six and eighty years have I served him, and he has done me nothing but good, and how could I curse him, my Lord and Saviour? If you would know what I am, I tell you frankly, I am a Christian." At these words the populace cried out that he should die at the stake, and hastened to bring fuel. He refused to be fastened, and met his fate with fortitude and calmness. Polycarp wrote several homilies and epistles, all of which are now lost except a short epistle to the Philippians, chiefly valuable as a means of proving, by its use of Scriptural phraseology, the authenticity of most of the books of the New Testament. In the time of St. Jerome it was publicly read in the Asiatic churches.

POLYCLETUS, a Greek sculptor, born probably at Sicyon, flourished about 430. He was a citizen of Argos, and is said to have been the pupil of the Argive Ageladas, in whose school Phidias and Myron were his fellow students. He was judged to have surpassed Phidias in images of men, though not in those of the gods. His statue of Juno in the temple between Argos and Mycenæ was thought by Strabo to be equal to the Jupiter and Minerva of his great rival. The goddess was seated on a throne, crowned with a garland on which were wrought the Graces and the Hours. The head, breast, arms, and feet were of ivory, and the robe which covered the figure from the waist downward was of gold. A statue which he executed, known as the Spear Bearer, was so exquisitely proportioned that it was called the canon or rule, and artists came from all parts to study it. Polycletus also wrote a treatise on the proportions of the human form. He was acknowledged to be the greatest architect of his time, and designed the theatre at Epidaurus, which Pausanias pronounced the finest of Greek and Roman theatres.

POLYCRATES, a tyrant of Samos, killed in 522 B. C. In conjunction with his brothers Pantagnotus and Syloson he seized the sovereignty of Samos. Having assassinated one brother and banished the other, he strengthened the city, enlisted 1,000 archers and manned 100 galleys, and made war with unvarying success upon the neighboring territories. According to Herodotus, Amasis king of Egypt, his friend and ally, wrote to him to sacrifice his most valued possession in order to forestall the misfortunes that Nemesis must have in store for him. Polycrates accordingly threw into the sea a ring of marvellous value; but after some days the ring was found in the stomach of a fish which had been presented to the tyrant. Amasis, more fearful than ever, then broke off his alliance. Grote thinks it more likely that it was Polycrates who broke the alliance in order to cultivate the friendship of Cambyses, to whom he furnished 40 galleys for the invasion of Egypt. He manned these with such of his subjects as he thought to be hostile to himself. They deserted Cambyses, returned to Samos, and attacked Polycrates, but were defeated. They then obtained the assistance of the Spartans and Corinthians, and again attacked Polycrates, but were finally defeated. Afterward Orœtes, the satrap of Sardis, lured him into Magnesia, and he was seized upon his arrival and crucified.

POLYDORE VERGIL. See VERGIL.

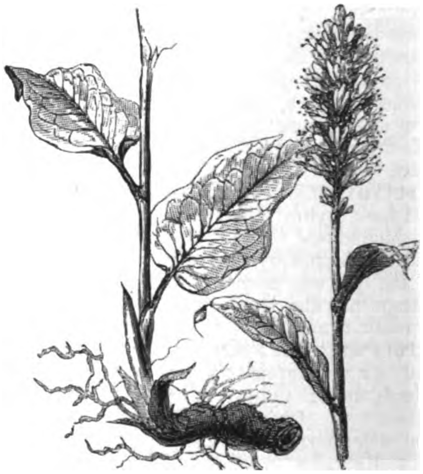
POLYGAMY (Gr. πολύς, many, and γαμεῖν, to marry), a state in which a man has at the same time more than one wife, or a woman more than one husband. The latter custom, more commonly called polyandry, prevails in Thibet and Cashmere, among the Coorgs, Todas, Nairs, and other races in India, in Ceylon, in New Zealand, among some of the Malayo-Polynesian races, in the Aleutian archipelago, among the Koriaks in Siberia, on the Orinoco, and in parts of Africa. Yet on the whole, as Sir John Lubbock observes, legal polyandry (as opposed to mere laxness of morality) seems to be an exceptional system, generally intended to avoid the evils arising from monogamy where the number of women is less than that of men. The opinion often advanced that births of male children are predominant in polyandrous relationships is not supported by recent accurate investigations. Polygamy has existed from time immemorial, especially among the nations of the East. It is mentioned as prevailing before the flood (Gen. iv. 19), was common among the patriarchs, and was tolerated by the laws of Moses (Exod. xxi. 10, and Deut. xxi. 15). But the custom appears to have died out among the Hebrews about the beginning of our era, for in the New Testament we meet with no trace of it, and the passages which refer to marriage seem to imply that monogamy was the universal rule, though from the Talmud it is evident that polygamy was still lawful. There are no positive injunctions in the Bible or in the Talmud against the practice, and the rabbis of the East tolerate it even now, though those of the West strictly prohibited it more than eight centuries ago. In the East the custom has been almost universal, being sanctioned by all religions, including that of Mohammed, which allows a man to have four wives; but the permission is rarely used except by the rich, and the Arabs scarcely ever have more than one wife. By Hindoo law a man may have wives without limit, and may keep as many concubines as he chooses, though the latter is permitted rather by custom than by law. Lubbock mentions two chief causes of polygamy: one, that in tropical countries, where it predominates, girls become marriageable very young and soon lose their external attractions, and that therefore every man who is able to do so provides himself with a succession of favorites, even when the first wife remains not only nominally the head, but really his confidant and adviser; the other, that among people who have no domesticated animals to provide milk, the children are not weaned until they are two, three, or even four years old, and as during this period husband and wife generally remain apart, unless a man has several wives he is often left without any at all. Among the Greeks, at least of later times, polygamy was never practised, although in the Homeric age it seems to have prevailed to some extent. In republican Rome it was not known; but during the existence of the empire the prevalence of divorce gave rise to a state of things analogous to it. In the Christian church it has never been tolerated. It prevailed among the barbarous nations of antiquity, with the exception of the Germans, who, Tacitus says, "almost alone among the barbarians, are content with a single wife."—In England the punishment of polygamy was originally in the hands of the church. A statute of Edward I. placed it among the capital crimes; but it did not come entirely under the control of the temporal power until a statute of James I. made it punishable with death like other cases of felony.

It is now punishable, by the statute 24 and 25 Victoria, c. 100, by penal servitude not exceeding seven years, or by imprisonment not exceeding two years, with or without hard labor. In the United States, the punishment varies in the different states, being usually imprisonment for a certain period, or fine, the second marriage being of course a nullity. In these countries, however, the term bigamy is most in use, as the plurality seldom extends beyond two; and in legal proceedings it is even employed where that number is exceeded.—In modern times polygamy has had some defenders, most of whom have grounded their defence on the absence of an express prohibition in the Scriptures. Bernardus Ochinus, general of the Capuchin order and afterward a Protestant, published in the 16th century "Dialogues in favor of Polygamy," to which Beza replied. A still stronger view was taken in a work called *Polygamia Triumphatrix*, published at London by John Lyser, a Lutheran divine (1692). It was boldly maintained in a treatise called "Thelyphthora, or a Treatise on Female Ruin," by the Rev. Martin Madan (2d ed., 3 vols. 8vo, London, 1781), who however limited the privilege to men. He argued that St. Paul's injunction that a bishop "should be the husband of one wife" implies that other men should have as many as they choose. Singularly enough, the Mormons, the only sect among Christian nations in which this custom is still practised, explain this same passage as meaning that a bishop should be the husband of one wife at least, and that there is no prohibition of his having more if he wishes. Polygamy was introduced among the Mormons by a "revelation" of Joseph Smith in 1843, but for some years only existed secretly. An act of congress, approved July 1, 1862, makes bigamy committed in a territory of the United States, or other place over which the United States have exclusive jurisdiction, punishable by a fine not exceeding $500, and by imprisonment not exceeding five years.

POLYGLOT (Gr. πολύς, many, and γλῶττα, a tongue), a book with versions of its text in several languages. In common use the word is generally restricted to the Bible. The *Biblia Hexapla* of Origen is regarded as the first polyglot, though only two languages, Hebrew and Greek, are used in it. Only some fragments of this work have come down to us, and these were published by Montfaucon under the title *Hexaplorum Originis quæ supersunt* (2 vols. fol., Paris, 1714). In 1501 Aldus Manutius planned a polyglot in Hebrew, Greek, and Latin, but only one sheet of it was printed. The Complutensian polyglot is the earliest of the several Bibles properly called polyglots. It was printed at Complutum, the Latin designation of Alcalá de Henares, in Spain, at the expense and under the superintendence of Cardinal Ximenes. Though begun in 1502 and finished in 1517, it was not published till 1522, appearing in 6 vols. fol. The first four contain the Hebrew text, with Hebrew primitives in the margin, and ancient versions of the text. The first contains the Pentateuch in four languages on each page, namely, the Hebrew text, the Latin Vulgate, the Septuagint Greek version with interlinear Latin translation in parallel columns, and below them the Chaldee Targum of Onkelos with a Latin translation side by side. Vols. ii., iii., and iv. contain the rest of the Old Testament in three languages on a page, Hebrew text, Latin Vulgate, and Septuagint Greek version, with interlinear Latin translations in parallel columns; vol. iv. containing the 1st, 2d, and 3d books of Maccabees, in Greek with interlinear Latin translation, and the Latin Vulgate. Vol. v. contains the New Testament in two languages, the Greek text and the Latin Vulgate, side by side on the same page, with marginal references. Vol. vi. contains a Hebrew lexicon and grammar, a Latin and Hebrew vocabulary, proper names with their derivation and meaning, &c. Of this work only 600 copies were printed. Cardinal Ximenes spared no expense in securing the best scholars of the age and the best manuscripts accessible for their use. The current Greek text of the New Testament is largely indebted to that of the Complutensian polyglot. The Antwerp polyglot was printed by Christopher Plantin (8 vols. fol., 1569–'72). The work was conducted by Arias Montanus, who had about 60 assistants, and was published under the sanction of Philip II. of Spain. It contains the whole Complutensian polyglot, with a second Chaldee paraphrase of a part of the Old Testament, a Syriac version of the New Testament, and the Latin translation of Sanctes Pagninus, altered by Arias Montanus. Vols. vi., vii., and viii. consist of lexicons and grammars. Of this polyglot only 500 copies were printed, and the greater number of these were lost at sea on their way to Spain. The third great polyglot, the Parisian, published by Gui Michel le Jay, was printed at Paris by Antoine Vitré (10 vols. largest fol., 1628–'45). It contains all that is in the Complutensian and Antwerp polyglots, with an Arabic version of the Old and New Testaments, a Syriac version of the former, and the Samaritan Pentateuch. A work superior to all these is the London polyglot, edited by Brian Walton (6 vols. large fol., 1654–'7). In the course of this work nine languages are used, viz.: Hebrew, Chaldee, Samaritan, Syriac, Arabic, Persian, Ethiopic, Greek, and Latin. No one book is given in all these, but portions of the work are printed in seven languages all presented at one view. It was printed during the protectorate of Cromwell, who allowed the paper to be imported free of duty. For this the lord protector received in the preface a merited acknowledgment, which was cancelled at the restoration, and another leaf was substituted, with a paragraph reflecting severely on the anti-royalist party. Copies containing the expunged paragraph are called republican, in distinction from the substituted royalist copies. There are also several minor polyglots. Two editions of the Pentateuch were printed in Constantinople, one in 1547, the other in 1551, with versions in four languages, but all in Hebrew characters. The first edition of the Heidelberg polyglot, in Hebrew, Greek, and Latin, appeared in 1586. In 1596 a polyglot by David Wolder, in Hebrew, Greek, Latin, and German, was published at Hamburg. The improved polyglot of Elias Hutter, containing the Old Testament as far as the end of Ruth, in Hebrew, Chaldee, Greek, Latin, German, and French, appeared at Nuremberg in 1599. In the following year Hutter printed the New Testament in 12 languages: Hebrew, Syriac, Greek, Latin, German, Italian, Spanish, English, French, Danish, Bohemian, and Polish. The polyglot of Christian Reineccius (Leipsic, New Testament 1712, Old Testament 1750–'51) is in Syriac, Greek, Latin, and German. The polyglot most accessible to scholars is Bagster's, published by the London bookseller of that name (1 vol. fol., 1831). This gives the Old Testament in eight languages, and the New Testament in nine. Eight languages are exhibited at one view, viz.: Hebrew, Greek, English, Latin, German, Italian, French, and Spanish. The New Testament in Syriac, the Samaritan Pentateuch in Hebrew characters, the notes and readings of the Masoretic and other variations, are appended. The Lord's prayer was printed in Paris in 1805, by M. Marcel, in 90 languages, with characters proper to each. The *Mithridates* of Adelung (4 vols., Berlin, 1806–'17) contains the Lord's prayer in nearly 500 languages and dialects.

POLYGNOTUS, a Greek painter, born in the island of Thasos about 493 B. C., died about 426. On Cimon's return to Athens from the expedition against Thasos in 463, Polygnotus accompanied him, and was employed by him in the decoration of the temple of Theseus, the Anaceum, and the Pœcile. About 460 he was engaged with Phidias on the temple of Athena Area at Platæa, where in conjunction with Onatas he painted the walls of the portico. Soon after the death of Cimon he went with other artists to Delphi to decorate the edifices connected with the great temple. He returned to Athens in 435, and was employed upon the Propylæa. Polygnotus painted both on walls and, in the more usual manner of Grecian artists, on panels, which were afterward let into the walls. In the Stoa Pœcile at Athens he represented the Greeks, after the fall of Troy, assembled to judge the case of Cassandra's violation by Ajax. In the Anaceum, or temple of the Dioscuri, he painted the "Marriage of the Daughters of Leucippus." Polygnotus was recognized in his time as at the head of his art. He was the first who gave variety to the expression of the countenance, or ease or grace to the outlines of figures or the flow of drapery. According to Pliny, he was the first who used the *sil* or yellow ochre found in the Attic silver mines, and he also made a new pigment of black from the husks of pressed grapes.

POLYGONUM (Gr. πολύς, many, and γόνυ, knee, from the numerous joints), a large genus of annual or perennial herbs, rarely under-shrubs, giving its name to a somewhat important family, the *polygonaceæ*, which includes among others the rhubarb, buckwheat, the docks, and sorrel. In most of the genera the stipules, above the swollen joints of the stem, are united to form a sheath, a character quite conspicuous in most species of *polygonum*, by which they may be recognized at sight. The flowers are apetalous, with a five-parted, mostly petal-like calyx; stamens four to nine; pistil with a single-celled ovary, with two or three styles, and forming in fruit a lenticular or a three-angled akene. There are about 25 species east of the Mississippi, most of which are natives; but few are showy, and some are common weeds. Recently glowing accounts have been published of a remarkable tanning plant discovered in Nebraska; this proves to be the water persicaria, *P. amphibium*, common all over the country and in Europe, and like several other species containing some tannin, though not a very large amount. *P. orientale* is a tall species from India, sometimes seen in old gardens under the names of prince's feather and ragged-sailor; it is sparingly naturalized in waste grounds. The lady's-thumb (*P. persicaria*) has its peach-like leaves usually marked with a blackish spot near the middle; it is an introduced plant and a very common weed in cultivated grounds, as is *P. Pennsylvanicum*, a native species which closely resembles it, but has hairy branches. Several of the species have a highly acrid juice, which is capable of producing inflammation and even



Polygonum bistorta.

blistering when applied to the skin, whence they are known as smartweeds and water pepper; *P. hydropiper* is the most common of these, a decoction of which thickened with meal is very popular with western physicians as a local stimulant. Knot grass (*P. aviculare*), also called goose grass and door weed, is a small species and one of the commonest weeds about dwellings. Black bindweed (*P. convolvulus*) is a small twining vine introduced from Europe, and here as well as there often troublesome among grain crops. There are several native climbing species, the most conspicuous of which, *P. dumetorum*, is known as climbing buckwheat, and is abundant in moist places. Bistort (*P. bistorta*), so called because the root is sometimes bent twice, is a European species, occasionally seen in old gardens, where it is cultivated for its rather pretty pink flowers and for its astringent roots, which were formerly used in domestic medicine; the roots contain an abundance of starch, and, after the astringency has been extracted by steeping in water, are in times of scarcity used as food in Siberia and Russia. *Polygonum cuspidatum* is a hardy perennial species from Japan, introduced into our gardens a few years ago; it is 3 or 4 ft. high, and an effective plant, though difficult to eradicate when once established.

POLYHYMNIA, or **Polymnia** (Gr. *πολύς*, many, and *ὕμνος*, hymn), in Greek mythology, one of the nine muses. She presided over eloquence and the higher lyric poetry. The invention of the lyre was ascribed to her. On ancient monuments she is represented in an attitude of meditation.

POLYNESIA (Gr. *πολύς*, many, and *νῆσος* island), a name applied by geographers to all the islands, north and south of the equator, lying between the Philippines, Papua, New Britain and neighboring islands, Solomon's islands, New Hebrides, and New Zealand, and the meridian of 100° W. The principal islands included in Polynesia are the Hawaiian, Marquesas, Paumotou, Society, Samoan, Friendly, Feejee, Caroline, Ladrone, Marshall, and Gilbert groups. The term Polynesia was originally applied by French geographers to the various islands scattered over the Pacific, including Australia; but it is now restricted to the limits here defined. (See Malayo-Polynesian Races and Languages.)

POLYNICES. See Eteocles.

POLYP (Gr. *πολύς*, many, and *πούς*, foot), a name formerly applied to the three classes of *radiata*, the coral animals and *actiniæ*, jelly fishes or *medusæ*, and the echinoderms. The name as thus extended was given from the numerous prehensile organs around the mouth, like those of the cephalopods (cuttle fishes); now it is generally restricted to the first class, called zoöphytes by Prof. J. D. Dana in his "Report" (8vo, New Haven, 1859). He defined polyps as radiated animals, usually attached at the base, with a coronet of tentacles above and a toothless mouth in the centre, with an inner alimentary cavity to which the mouth is the only opening; they are hermaphrodite, reproducing by buds and eggs, with very imperfect circulation and no special organs of sense. Prof. Verrill has since divided polyps, excluding the hydroids, into the three orders of *alcyonaria*, *actinaria*, and *madreporaria*. *Alcyonaria* include polyps with eight (occasionally six) long pinnately lobed tentacles around a narrow disk, compound by budding, with the three suborders: 1, *pennatulacea* or sea pens, forming free-moving communities; 2, *gorgonacea*, whose polyps are cylindrical, short, connected laterally, and secreting a solid central axis, varying in form, and often very delicate and beautiful; 3, *alcyonacea*, comprising polyps turbinate at the base, usually incrusting other bodies; here belongs the organ-pipe coral. *Actinaria*, with conical or cylindrical tentacles, and ambulacral spaces always open, have the three suborders *actinacea*, *antipathacea*, and *zoanthacea*, including the free sea anemones and several fixed families. *Madreporaria* have polyps simple or compound, with expanded form, simple conical tentacles, solid coral being usually deposited in their tissues or partitions; they are mainly confined to warm seas, and include the madrepores, astræas, fungias, brain corals, and others which go to make up the ordinary coral reef. Prof. Dana, in his "Corals and Coral Islands" (1872), makes the three great subdivisions: 1, actinoids, related to the anemones, with tentacles and septa a multiple of six; 2, cyathophylloids, with tentacles and septa a multiple of four; these were the earliest corals, and most abundant in palæozoic time; 3, alcyonoids, with eight fringed tentacles like *gorgonia*. He adopts the tribes of Prof. Verrill, except that he unites the coral-making and non-coral-making species into the one division of actinoids, and separates from these the cyathophylloids. (See Actinia, and Coral; and for details of structure, mode of growth, and figures, the works of Profs. Verrill and Dana.)

POLYPHEMUS, in classical mythology, the principal of the Sicilian Cyclops, a son of Neptune, who is represented by Homer as a gigantic shepherd, with one eye in the centre of his forehead, and dwelling alone in a cave. Ulysses and his followers, having taken refuge in this place, were discovered by Polyphemus on his return from feeding his flocks, and by him were fastened in the cave with a huge stone. After he had eaten six of Ulysses's companions, Ulysses took revenge upon him by getting him intoxicated, and burning out his single eye. The next morning Ulysses fastened himself and his companions to the bellies of the gigantic sheep as the blind Cyclops let them out to pasture, and thus escaped.

POLYPODIUM. See Ferns.

POLYPTERUS. See Gar Fish.

POLYPUS, a name applied in pathology to various morbid growths projecting into the mucous cavities and passages, having their origin either in or beneath these membranes. These growths or excrescences may be in the vicinity of the natural openings of the body, as in the nasal fossæ and rectum, and therefore within the sight and reach of the surgeon; or interior, as in the uterus, bladder, &c., inaccessible to his eye and very often to his instruments. They are usually single, sometimes multiple; their extent is very variable, according to their time and freedom of growth, and their surface may be inflamed or ulcerated. There are two principal forms: the pediculated, with a more or less long and narrow neck, as in the nasal passages; or sessile, in which the morbid mass simply raises the tegumentary membrane. Some are easily crushed, others are very hard. In the soft, mucous, or vesicular polypus, the appearance is semi-transparent, gelatinous, consisting of a mass of areolar tissue, containing an albuminous fluid, covered by a thin adherent membrane; it sometimes contains vesicles; the vessels are few and fine. Themselves insensible, these tumors give trouble only by their volume, rarely cause hæmorrhage, irritation, inflammation, or any grave symptom, and do not degenerate into malignant disease; they are also hygrometrical, growing larger in damp weather; nothing positive is known as to their causes. A more solid form consists of a concrete, grayish albumen, enclosed in areolar tissue, covered by a slightly vascular membrane. In the spongy polypus the tissue is soft, red, vascular, often giving rise to troublesome bleeding, and prone to undergo cancerous degeneration. The fibrous polypus may acquire a considerable size, and is generally pear-shaped, though sometimes of very strange forms; it is lobulated, smooth, and firm, except when subsequently softened and ulcerated; itself insensible, it may cause pain by pressure on surrounding parts; when softened or gangrenous, it may lead to bleeding or to offensive discharges equally exhausting. The fleshy polypus is vascular, painful, and prone to degeneration; the cartilaginous forms may undergo more or less osseous transformation. Polypus is generally a product of the hypertrophy of some one or more of the anatomical elements of the tissue from which it takes its origin. These tumors impede the functions of the organs with which they are connected; impairing smell and taste when in the nasal cavities, in the pharynx interfering with swallowing, in the auditory meatus with hearing, in the larynx with the respiration and the voice, in the rectum with defecation, in the bladder with the excretion of urine, and in the uterus with reproduction. The treatment consists of local applications for drying up or destroying the growth; or of excision, tearing off, laceration, seton, compression, ligature, and similar applications of modern surgery. In the nose the common form of the polypus is the gelatinous, and its favorite attachment the turbinated bones; its presence is indicated by a constant stuffed feeling as from a cold in the head, increased in damp weather; it may generally be brought into view by forcing air through the affected nostril, while the other is closed; there are sometimes more than one, and they are very liable to return when removed; if allowed to remain, the increasing size blocks up the nostril and displaces the septum, producing often great deformity on the cheek and about the eye; it is generally twisted off from its narrow peduncle by forceps. The hydatid, cancerous, and fungoid polypi admit only of palliative treatment. Uterine polypus is generally pear-shaped and attached by a narrow neck; the symptoms are those of uterine irritation, such as dragging pains, menorrhagia, and fetid discharges; it is generally removed by ligature. In other polypi near the external openings of the body the principles of treatment are the same; in the internal forms the diagnosis is obscure, and the treatment simply palliative.

POLYSPERCHON, a general of Alexander the Great, died about 300 B. C. He distinguished himself in the Persian and Indian campaigns, but, not being in Babylon at the time of Alexander's death in 323, was disregarded in the distribution of power which ensued. He then attached himself to Antipater, and so gained his esteem that, passing over his own son Cassander, the regent appointed him his successor (319). He had at once to contend both against Cassander and Antigonus. He allied himself with Olympias, the mother of Alexander, sought to gain over the Greek cities by abolishing their oligarchical governments, surrendered Phocion to his enemies, and invaded the Peloponnesus. The valor of the Megalopolitans, however, forced him to retreat. At the same time he lost Macedonia, but recovered it with the assistance of Olympias (317). He was soon expelled by Cassander, and played an inglorious part in that general's struggle with Antigonus, joining first one side and then the other. In 310 he attempted to restore his fortunes by reviving the claims of Hercules, the last surviving son of Alexander, but soon sacrificed him to Cassander. Polysperchon is last mentioned in 303.

POLYXENA, a daughter of Priam and Hecuba, beloved by Achilles. One legend relates that Achilles, for the sake of obtaining her in marriage, promised Priam to make peace between the Greeks and Trojans, and, going to the temple of the Thymbræan Apollo to conclude the negotiations, was treacherously slain by Paris. Polyxena was therefore sacrificed to his manes, according to one account on his tomb, according to another on the coast of Thrace. Another form of the legend represents Polyxena and Achilles to have fallen in love when the dead body of Hector was given up, and that when the Greek champion was slain she killed herself upon his tomb.

POLYZOA (Gr. πολύς, many, and ζῶον, animal), a name given by Thompson to the lowest of the molluscoids, popularly known as sea mosses and sea mats; Ehrenberg called them *bryozoa*. They form colonies of distinct similar zoöids, protected usually by a horny or chitinous integument. They look much like hydroids, but the separate cells of the colony are merely connected externally, without direct communication with each other. The separate zoöids are called polypides, and each is enclosed in a double sac, the outer wall of which, or ectocyst, is chitinous or calcareous, the inner being a delicate endocyst. The mouth is surrounded by ciliated tentacles, the movements of which create currents in the water which bring them their food; these can be more or less retracted into the sac. There is a well marked gullet, stomach, and distinct alimentary canal, with the vent at the upper part of the sac; the nervous system is essentially a single ganglionic mass, between the gullet and the anus, which gives off filaments in various directions; the circulation is carried on by means of cilia, there being no distinct heart, and no definite course to the circulating fluid; respiration is effected chiefly by the crown of ciliated tentacles around the mouth. There are distinct reproductive organs within the sac; they are all hermaphrodite, the eggs being dropped into the body cavity, where they are fertilized; they also reproduce by continuous budding and discontinuous gemmation. An organ, called the "bird's head process," with pincer-like beaks which are constantly snapping together, has not been assigned for any definite use. Most of the polyzoa are fixed and plant-like; but the fresh-water *cristatella* colony creeps about on a base flattened like the foot of a slug. In the fresh-water forms the crown of tentacles generally assumes the horseshoe shape, while in the marine it is circular. For descriptions and figures of the fresh-water polyzoa see "American Naturalist," vol. i., 1868. (See BRYOZOA.)

POMBAL, Dom Sebastião José de Carvalho e Mello, marquis of, a Portuguese statesman, born in Lisbon, May 13, 1699, died at Pombal, May 5, 1782. He studied law at Coimbra, served for a time in the army, went to court, and in 1739 became envoy extraordinary to London. Thence he was sent in 1745 to Vienna, where he successfully mediated between the Austrian government and Pope Benedict XIV., and married the countess of Daun, whose influence secured for him in 1750 the appointment by King Joseph as minister of foreign affairs. He soon gained such complete ascendancy over Joseph as enabled him to effect, in spite of the nobility, a series of important reforms in the colonial affairs and in the internal administration. After the earthquake of November, 1755, he passed 14 days and nights in his carriage amid the ruins of Lisbon, for the relief of distress and the protection of the lives and property of the citizens against the banditti. He afterward directed the rebuilding of the city. In 1756 he became first minister. In 1758 a band of assassins attacked the king near Lisbon, and shortly afterward, at the instigation of Carvalho, the duke of Aveiro, the marquis of Tavora with his wife and two sons, and the count of Atougia, were arrested and executed as principals in the conspiracy, and several of their accomplices were thrown into prison. The Jesuits, who were suspected of implication in the plot, were banished from the kingdom by a royal decree of Sept. 3, 1759, many of their number having already been imprisoned and put to death. In the same year Carvalho was created count d'Oeiras, and in 1770 marquis of Pombal. On the death of Joseph in 1777, he was dismissed through the intrigues of the remaining friends of the Jesuitical party and of the nobility, and banished to a distance of 60 m. from the court. In spite of many abuses of power, Pombal is still called by his countrymen "the great marquis," and it has been well remarked that "never had so small a kingdom so great a minister."

POMEGRANATE (Lat. *pomum*, a fruit, and *granatum*, grained or many-seeded), a fruit-bearing tree botanically known as *Punica granatum* (Lat. *Punicus*, of Carthage). It was known from the earliest times, as frequent reference is made to it in the Mosaic writings, and sculptured representations of the fruit are found on the ancient monuments of Egypt and in the Assyrian ruins. It is found in a truly wild state only in northern India. The shrub, or small tree, rarely exceeds 15 or 20 ft. in height, with very numerous, slender, twig-like branches; the leaves are oblong or obovate, opposite or scattered, and often clustered on the branchlets; the flowers are terminal, usually solitary, with a leathery calyx, colored like the petals, its tube coherent with the ovary, and its limb five- to seven-lobed, bearing on its throat five to seven petals and numerous stamens; the ovary has two sets of cells, one above the other; the lower portion has three cells and the upper five to seven, each with many ovules; the fruit is a large berry, crowned with the calyx lobes, having a very leathery rind, and containing numerous seeds; each seed is enclosed in a sac or pellucid vesicle, which contains a thin, acid, usually crimson pulp; these sacs are about half an inch long and somewhat angular by mutual compression; the interior of the fruit has the same number of divisions as there are cells in the ovary. The unusual structure in the ovary and fruit has made the pomegranate rather difficult to classify; it has many points of relationship with the myrtle family, and is by some botanists placed there; others follow Endlicher in giving it an order to itself, the *granateæ*, while Hooker and Bentham class it as an anomalous genus in the loosestrife family (*lythraceæ*). There is but one species, with several marked varieties, one of which, a dwarf, has been called *Punica nana;* the flowers are generally scarlet, but there are yellow and white-flowered as well as double-flowered varieties, and a form with variegated foliage. The fruit varies much in size and somewhat in color, usually being orange-yellow with a crimson cheek; sour-fruited, sub-acid, and sweet-fruited varieties are recognized; though the sour variety has the largest and handsomest fruit, it is too acid to be pleasant. The edible portion of the fruit is the pulp surrounding the seeds, in eating which the seeds themselves are swallowed; the fruit is highly ornamental upon the table, and when carefully divided in halves presents a singularly beautiful appearance, the shining bags of pulp looking like amethysts; a popular way of serving the fruit in warm countries is to remove the grains carefully, sprinkle them with sugar, and add wine enough to moisten them. The pomegranate is hardy and bears fruit as far north as the Ohio river and Maryland, but it attains much greater perfection further south, as it requires a long season for ripening; the neighborhood of Augusta, Ga., is celebrated for the excellence of its fruit; even in the climate of New York city, if trained upon a wall or trellis in a sheltered place and covered during the winter, it will bear, and some seasons ripen its fruit. It grows in great perfection in northern Mexico, where it was early introduced by the Jesuit missionaries; the vicinity of Magdalena, in the state of Sonora, is celebrated for the abundance and fine quality of the fruit; the writer, having purchased two dozen pomegranates at Magdalena for a *real* (12½ cts.), found that several specimens measured 16 in. in circumference, with the grains correspondingly large and delicious; a large share of the crop is used in distilling *aguardiente*, a most fiery spirit. The double varieties do not produce fruit, and are more tender than the single; they are grown as greenhouse plants, or in tubs set out in summer and housed in the cellar during winter. The plant is used in the south of Europe to make ornamental hedges.—The pomegranate contains a great deal of tannin, which is especially abundant in the rind of the fruit, the bark of the root, and to a less degree in the flowers, and these parts were used medicinally by the ancients. So astringent is the rind that in eating the pulp it is necessary to avoid those portions of it which extend into the interior as partition walls and placentæ; it is used in tanning morocco leather, and to some extent for making ink; it was formerly much used in medicine as an astringent, but is now little employed in this country; the flowers, called balaustines, are used in some countries for a similar purpose. The bark of the root has been long known as a vermifuge, and is especially efficacious against the tænia. It may be given as a powder, though a decoction or extract is preferable. A moderate dose is liable to produce nausea and sometimes vomiting, colic, or diarrhœa; a larger one headache, vertigo, and even gastro-intestinal inflammation. An acrid substance called punicine, resembling an oleo-resin, has been extracted from it. The dose of the bark in powder is 20 to 30 grains, but a decoction of 2 oz. to a pint may be taken in three doses. The fresh bark is the most effectual.

Double-flowered Pomegranate, and Fruit of Single-flowered.

POMERANIA (Ger. *Pommern;* Wendish, *po*, along, and *more*, sea), a province of Prussia, bordering on the Baltic sea, West Prussia, Brandenburg, and Mecklenburg; area, 11,629 sq. m.; pop. in 1871, 1,431,633, including 14,000 Roman Catholics and 13,000 Jews, nearly all the rest being Lutherans. It is divided into the districts of Stettin, Köslin, and Stralsund. On the N. coast are the islands of Rügen, Usedom, and Wollin. The largest river is the Oder, which forms below Stettin the lake of Damm and the Grosses and Kleines Haff, and flows into the Baltic through three channels. The principal of the numerous lakes are those of Kummerow, Plöne, and Madüe. Pomerania is one of the most level regions of Germany. The soil, though mostly sandy, is generally fertile, and the province is celebrated for its large number of landed proprietors. It raises more sheep and possesses more registered vessels than any other province of Prussia. It is rich in agricultural products, cattle, and horses. There are prosperous fisheries, and many iron and glass works, paper and oil mills, breweries, distilleries, and manufactories of tobacco and other articles. The principal educational institution is the university of Greifswald.—Pomerania was in the early part of the middle ages a principal portion of the old

Wendish monarchy, and from 1062 had local dukes, whose line terminated with the death of Bogislas XIV. in 1637. It was frequently overrun by the Polish monarchs. Christianity was introduced in the 12th century. After the extinction of the Pomeranian dukes, the electoral house of Brandenburg had a claim to the whole country by right of former treaties; but as during the thirty years' war the province had come into the possession of Sweden, the former obtained only Further Pomerania (E. of the Oder). At the peace of Stockholm in 1720 Sweden gave up to Prussia the greater portion of Hither Pomerania, along with the islands of Wollin and Usedom, but continued to hold the district between Mecklenburg, the Baltic, and the river Peene, with the island of Rügen. This she ceded to Denmark as a compensation for Norway; and by the convention of June 4, 1815, it was given up to Prussia in exchange for the duchy of Lauenburg and the sum of 2,600,000 thalers.—See *Die Erwerbung Pommerns durch die Hohenzollern*, by Bohlen (Berlin, 1865).

POMERANUS, or **Pommer.** See BUGENHAGEN.

POMEROY, a city and the capital of Meigs co., Ohio, on the Ohio river, about midway between Cincinnati and Pittsburgh, at the terminus of the Atlantic and Lake Erie and the Springfield, Jackson, and Pomeroy railroads (in progress), 80 m. S. E. of Columbus; pop. in 1850, 1,638; in 1860, 6,480; in 1870, 5,824; in 1875, about 7,000. It is the fifth place on the river above Cincinnati in trade and commerce. Its prosperity rests mainly on the mines of bituminous coal within its limits and the immediate vicinity, yielding about 16,000,000 bushels annually, of which 10,000,000 are shipped. It is also in the centre of the salt basin of the Ohio valley, and there are 26 salt furnaces within its limits and in the neighborhood, producing about 6,000,000 bushels a year. The manufacture of bromine from the "bittern," or water from which the salt has been extracted, is carried on very extensively. Iron and nails, flour, carriages, boats, and furniture are also manufactured. The city contains two banks, a Roman Catholic orphan asylum, graded schools, two weekly newspapers, and 15 churches. Coal mining was first systematically commenced in 1838. The place was incorporated as a village in 1841, and as a city in 1868.

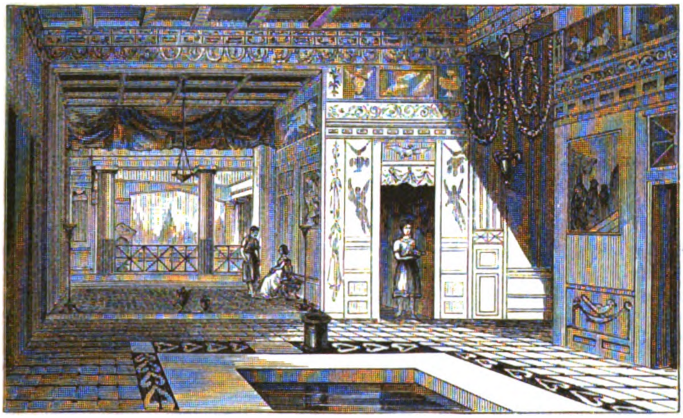
POMONA (Lat. *pomum*, a fruit), the Roman goddess of fruit trees and gardens. The Latin poets represent her as beloved by several of the rural deities, Sylvanus, Vertumnus, Picus, &c. Vertumnus obtained her affection and married her. She had a temple in Rome, with a priest called *flamen Pomonalis* to preside over her worship. In works of art she is generally represented as a young and robust female, seated on a basket of flowers and fruit, holding apples in her right hand and a branch in her left. In the Florentine museum is an antique marble statue of Pomona crowned with leaves and ivy berries, and holding up with both hands a fold of her flowing robe filled with grapes and other fruit.

POMONA, an island. See ORKNEY ISLANDS.

POMPADOUR, Jeanne Antoinette Poisson, marchioness de, mistress of Louis XV., born in Paris, Dec. 29, 1721, died in Versailles, April 15, 1764. She was the natural daughter of a butcher. Her mother gave her a good education, and married her in 1741 to a farmer of the taxes named Le Normand d'Étioles, shortly after which she first attracted the attention of the king while he was with a royal hunting party in the forest of Senart; but it was not until after the death of Mme. de Châteauroux (1744) that she became openly the king's favorite. She accompanied Louis during the campaign of Fontenoy in May, 1745, and on her return was presented at court by the title of marchioness de Pompadour. She patronized learning and the arts, embellished Paris, and with the assistance of Voltaire and Bernis organized brilliant fêtes. Even after she had lost to a great degree her hold upon the king's affections, she retained her power by making herself necessary to his comfort. She soon undertook to save him from the fatigues of government. She interfered with the finances, made and unmade ministers, and favored by turns the Jansenists, the Quietists, the infidels, and the parliament, that she might have the support of all parties. Flattered by Maria Theresa, who sent her an autograph letter, and irritated by the sarcasms of Frederick II. on the *dynastie des cotillons*, she brought about the alliance of France and Austria against Prussia which resulted in the disastrous seven years' war. In 1757, after the attempt of Damiens to assassinate the king, she was obliged to quit the court; but being soon recalled, she caused the ministers D'Argenson and Machault, who had advised her dismissal, to be disgraced. Her influence upon military appointments was one of the chief causes of the ill success of the war. She recalled Marshal d'Estrées after the French victory at Hastenbeck, and prevented the recall of Soubise after the defeat at Rossbach. She dismissed the minister Bernis, who advised peace, and replaced him by Choiseul. But in Choiseul, to her dismay, she soon found a master. He assisted her indeed to procure the suppression of the Jesuits, but it soon became apparent that his power depended no longer on her favor. She died hated by the nation and little regretted by the king. Besides an annual income of nearly 1,500,000 livres, she had received the territories of La Celle, Crécy, and St. Remy; the châteaux of Aulnay, Brinborion, and Bellevue; and splendid establishments at Paris, Versailles, Fontainebleau, and Compiègne. She gave freely to the poor, patronized inventors, artists, and men of letters, and made magnificent collections of works of art and curiosities. She drew and engraved with considerable skill. The *Mémoires* and *Lettres* published under her name are not authentic. — See *Madame de*

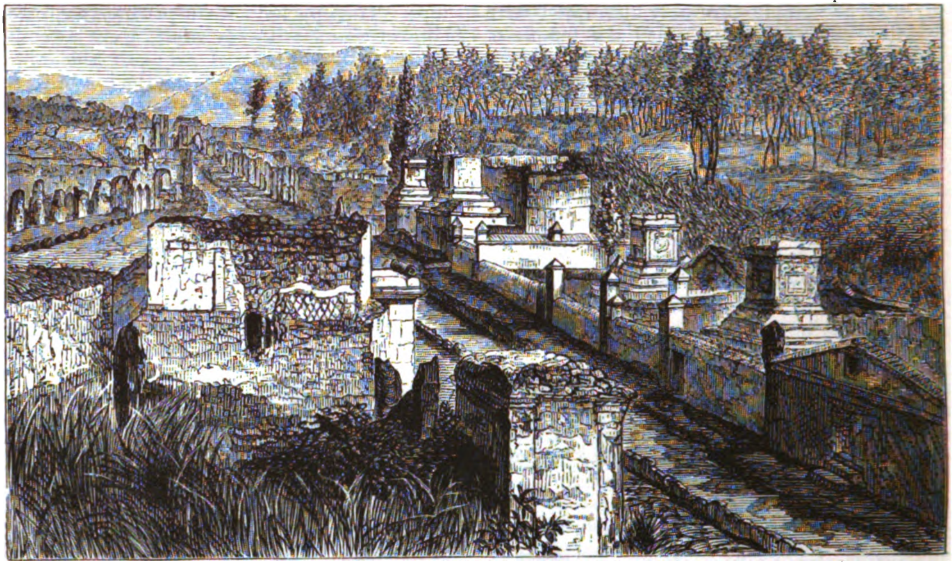
Pompadour, by Capefigue (Paris, 1858), and *Les maîtresses de Louis XV.*, by De Goncourt (2 vols., Paris, 1861).

POMPEII, an ancient city of southern Italy, 12 m. S. E. of Naples, and at the foot of Mt. Vesuvius. Though probably several centuries older, it is not mentioned in history previous to the conquest of Campania by the Romans in the latter part of the 4th century B. C. The origin of the name is not known. During the social or Marsic war the inhabitants joined in the insurrection, but it escaped the punishment inflicted on the other cities. It became a favorite summer resort, and is mentioned as such by Seneca and Tacitus. In A. D. 59, in consequence of a sanguinary affray in the amphitheatre with the neighboring people of Nuceria, the inhabitants were prohibited by the emperor Nero from exhibiting any gladiatorial or theatrical shows within the city for ten years. Four years later Pompeii was partly destroyed by two earthquakes, occurring at an interval of a few months; and it was overwhelmed by the eruption of Vesuvius, Aug. 24, 79, which involved it with Herculaneum and Stabiæ in a common destruction. (See HERCULANEUM.) For nearly 17 centuries afterward the city disappears from history, although the name seems never to have been wholly lost. A village arose upon the site; but after the destruction of this by the eruption of 472, the Campus Pompeius, as it was long called, remained until the middle of the last century an undisturbed and uninhabited plain. The eruption of 79 produced striking physical changes in the vicinity, and the sea, which formerly laved the walls of the city, is now more than a mile from its site, while the river Sarno has been considerably diverted from its ancient course. Hence the geographer Cluverius, who investigated the subject in the early part of the 17th century, following the descriptions of ancient authors, was induced to locate Pompeii several miles from its actual position. The superincumbent deposit of ashes and cinders had an average depth of not more than 15 ft.; yet an aqueduct had been carried over part of the city a few years previously without leading to its discovery, although a portion of the great theatre was still visible. In 1748 several statues and other objects of antiquity were exhumed in sinking a well. Charles III. of Naples ordered excavations on an extensive scale, and in 1755 the amphitheatre was uncovered. His successors, including Victor Emanuel, have continued the work from time to time, until a large part of Pompeii has been brought to light. The city thus partially exhumed is of incalculable importance from the insight which it has afforded into the domestic economy, the arts, and the social life of the ancient world. The light and friable character of the volcanic deposits which overlaid it has preserved from decay the objects of most importance to modern archæologists, and the interiors of private and public buildings have been found undisturbed save by the original owners, who in many instances returned after the eruption had subsided to search for articles of value, and also probably for the bodies of relatives or friends. The latter supposition seems to be proved by the fact that comparatively few skeletons have been discovered, whereas, according to Dion Cassius, the loss of life was considerable, notwithstanding the inhabitants were assembled in the amphitheatre at the time of the catastrophe, and could readily make their escape.—Pompeii occupied within its walls, which have been traced throughout their whole extent, an irregular oval area about two miles in circumference. It has generally been supposed that the population was from 20,000 to 50,000; but according to Fiorelli, the general superintendent of the excavations, Pompeii had no more than 2,000 inhabitants in its earlier days, and no more than 12,000 at the time of its destruction. On the W. or sea side there are no traces of walls, and those remaining, though originally of great strength, being flanked at irregular intervals by massive square towers, appear to have been allowed to fall into decay many years before the destruction of the city. The workmanship of these indicates the Osco-Pelasgic origin of the city. Eight gates have been discovered, and the roads outside of them were lined on either side with tombs of considerable size and architectural pretension. The street of tombs before the gate of Herculaneum was the principal burial place of the city, and the sepulchral monuments adorning it give evidence of the refined taste and great wealth of prominent Pompeiians. The streets, which for the most part run in regular lines, are with some exceptions barely wide enough to admit the passage of a single vehicle, and everywhere the ruts of the chariot wheels are visible in the polygonal lava blocks of the pavement. The widest does not exceed 30 ft. in breadth, and few are over 22 ft. Five of the main streets have been partially or wholly traced, with which a regular system of minor streets appears to have been connected. These thoroughfares, with a single exception, terminate in or traverse the westerly quarter of the city, which is the only part yet completely explored, and which, from the number and character of the public buildings found there, was undoubtedly the most important. The forum, in the S. W. corner, is the most spacious and imposing structure, and in its immediate vicinity are the chief temples, theatres, and other public buildings. It was enclosed on three sides by a Doric colonnade, which embraced an area 160 yards long by 35 broad, and in its general plan as well as in its surroundings resembled the usual Roman structures of the kind. Of the buildings adjoining it, that known as the temple of Jupiter on the N. side is supposed to have been the most magnificent in the city, and its portico of Corinthian columns is perhaps the finest yet exhumed. On the E. side stood the pantheon or temple of Augustus, as it has been called; the Curia or Senaculum; the temple of Mercury; and a spacious house, called the Chalcidicum, which, as appears from an inscription, was erected by the priestess Eumachia. On the south are three buildings supposed to have been courts of justice, and on the west a basilica, a large temple profusely decorated with painting and commonly called the temple of Venus, and the public granaries and prisons. All of these afford striking evidences of the disastrous effects of the earthquakes of 63 and 64. The architecture, like that of most public and private edifices in Pompeii, is mixed, the style, whether Greek or Roman, being frequently defective, and the attempts to unite different orders clumsy and tasteless. Other public buildings were the temples of Fortune, of Isis, of Neptune or Hercules, and of Æsculapius, the names of the two last being conjectural. That of Neptune is of pure Doric architecture, not unlike the temple of the same name in Pæstum. S. E. of the forum, and at a distance of 400 yards, were the great or tragic theatre and the lesser theatre or Odeum, both of Roman origin. The former, having accommodations for about 5,000 people, stood on a slight elevation, and was never completely buried. In the S. E. angle of the city was the amphitheatre, an ellipse 430 ft. by 335, capable of seating 10,000 spectators; and immediately N. of the forum were the *thermæ* or public baths, in an elegantly adorned and well arranged structure. A long quadrangular building S. of and adjoining the great theatre is supposed to have been the barracks of troops or of gladiators. Numerous implements of war have been discovered there, and in and about the building were 64 skeletons, probably of men forming the guard, who remained at their posts. By means of seals and inscriptions found in them the names of the proprietors or occupants of many shops and dwellings have been recovered, and it is intended to affix these names in large letters over the entrances of the houses. The dwellings are for the most part small and low, few exceeding two stories, have little external ornamentation, and are well adapted to a people accustomed to pass most of the day in the open air. The ground fronts of many of the finest are occupied by shops. The upper stories of private dwellings, being of wood with flat roofs, were speedily consumed by the heated ashes of the eruption; but as these portions of the house were generally used as store rooms or apartments for servants, their loss is of little consequence. The lower or ground apartments, in which the family proper lived, have escaped serious injury, and about 100 human skeletons, and also several skeletons of dogs, horses, and various fowls, have been brought above ground in an excellent condition. In many of the dwellings the daily life, habits, tastes, and even the thoughts of the occupants can be traced with almost positive certainty. Of the houses of the better description, the names applied to which are either those of the supposed possessor, or are suggested by his occupation, or by prominent objects of art found in them, the most important are the house of Sallust, one of the largest and most complete in its arrangement and adornment in the city; that of Pansa; that of the tragic poet, less distinguished for its size than for the variety and beauty of its paintings, most of which have been removed to the museo Borbonico (now national museum) in Naples, and for the well known mosaic of the choragus instructing the actors; that of Meleager or the Nereids; that of Castor and Pollux, unsurpassed in magnificence and size, and equally ornamented within and without; that of the faun, or of the great mosaic, so called from the bronze figure of the dancing faun and the famous mosaic of the battle of Issus found there; and that of M. Lucretius, rich in pictures, mosaics, vases, bronzes, ornaments, and coins. Among the 70 statuettes and the bronze vessels ornamented with figures which have been recovered by Fiorelli, there is a youthful form with a Phrygian cap, sitting, and leaning his head on one hand, while the arm rests on the knee, which has won the universal admiration of modern artists; it is either a Ganymede or a Paris. Outside of the gate of Herculaneum are the remains of two extensive suburban villas, called with little reason the villas of Diomedes and of Cicero, the latter of which, after the removal of its trea-



Interior of the House of the Tragic Poet (restored).

sures toward the end of the last century, was again filled up with earth. Several houses were evidently entered by their owners immediately after the subsidence of the first eruption, in search of valuables. The most important paintings and objects of art discovered by excavation have been deposited in the museo Borbonico. Among them may be mentioned a beautiful painting of the landing of Aphrodite, and numerous representations of Narcissus, who seems to have been a favorite with the Pompeiians. The painting of Laocoön found in 1875 is one of the most important specimens of ancient art brought to light. Until recently the excavations proceeded slowly, the annual amount appropriated by the late Bourbon government having barely sufficed for repairs and incidental expenses; but since 1861 the government has liberally assisted the work, though the great care taken in unearthing the monuments has prevented any rapid progress. The space laid bare measured on June 30, 1872, 664,149 sq. ft., which is about one third of the whole area occupied by the city. Fiorelli calculates that, making the excavations on an average 25 ft. deep and employing 81 laborers daily, the whole city will be unearthed in 1947. Detailed accounts and illustrations of the results of the explorations in Pompeii will be found in Mazois's work, continued by Gau, *Les ruines de Pompéi* (4 vols. fol., Paris, 1812–'38); in Sir W. Gell's "Pompeiana" (4 vols. 8vo, London, 1824–'30; new ed. edited by John P. Gandy, London, 1875); Breton's *Pompeia* (8vo, Paris, 1855); Dyer's "Pompeii, its History, Buildings, and Antiquities" (London, 1867); Fiorelli's *Relazione degli scavi di Pompej dal* 1861 *al* 1872 (Turin, 1873); Curti's *Pompej e le sue ruine* (3 vols., Milan and Naples, 1874); and Overbeck's *Pompeji in seinen Gebäuden, Alterthümern und Kunstwerken* (3d ed., Leipsic, 1875).



Street of the Tombs.

POMPEY. I. Cneius Pompeius Magnus, a Roman general, born Sept. 29, 106 B. C., assassinated in Egypt, Sept. 28, 48. He was the son of Cneius Pompeius Strabo, under whom he first served in the social or Marsic war. During the struggle between Marius and Sulla he sided with the latter, and in 87 aided in the defence of Rome against Cinna and Sertorius, the partisans of Marius. When Sulla, after finishing the Mithridatic war, took up his march for Italy, Pompey raised on his own responsibility three legions, with which he defeated the Marian general M. Brutus and effected a junction with Sulla. During the war which prostrated the Marian party in Italy he gained great distinction as one of Sulla's legates. He next reduced Sicily, and in 81, crossing over to Africa, he overran Numidia, where the Marian party still held out, and crushed them in a battle, in which their general Cn. Domitius Ahenobarbus and 17,000 Numidians were slain. On returning to Rome he was met by the populace with acclamations, and the dictator bestowed upon him the surname of Magnus. Not content with this distinction, he claimed a triumph, a thing unheard of for a man of equestrian rank who had filled no office of state. To avoid contention, Sulla finally yielded, and the young general entered Rome in triumph in September, 81. Two years later Pompey again thwarted the wishes of Sulla by securing the election of M. Æmilius Lepidus to the consulship; but, true to the aristocratic party to which he had attached himself, he refused to aid the consul in repealing the constitution of Sulla, and when Lepidus in 77 marched upon Rome at the head of an army, he joined Catulus in defeating him. In the succeeding year he was sent by the senate to coöperate with Metellus Pius in the reduction of Spain, where Sertorius, the last and ablest general of the Marian party, continued to hold out against the aristocracy. Their first encounter resulted in the defeat of Pompey, and in several succeeding battles he was again worsted by his opponent. He received reënforcements from the senate, and Sertorius having been assassinated by his rival Perperna, he brought the war to a successful termination, and in 71 returned with his army to Rome. Passing through northern Italy, he cut to pieces a body of 6,000 gladiators, who had escaped from the battle in which their leader Spartacus was overthrown by Crassus, and thus claimed the merit of finishing the servile war also. His demand for a triumph was willingly granted, while Crassus, who had in reality crushed the formidable revolt of Spartacus, received only an ovation. In the following year Pompey and Crassus entered upon the consulship, notwithstanding both were excluded by the laws of Sulla; and the former increased his popularity by restoring the tribunician power, and instituting a reform of the judicial system. These measures involved the severance of his former party ties, and thenceforth for many years he was the avowed enemy of the aristocracy. For two years after the expiration of his consulship he kept aloof from civil affairs; and in 67, after an obstinate resistance by the aristocracy, he was appointed with unlimited and irresponsible power for three years commander-in-chief of an immense naval force destined to exterminate the pirates who infested the Mediterranean. He speedily cleared the sea west of Greece of the enemy, and sailing eastward annihilated their entire force in a great battle off Coracesium, on the coast of Cilicia. In three months the war was completed, and the victorious commander, during his absence from Rome in 66, was invested by acclamation with the command of the war against Mithridates. This commission was accompanied with a grant of unlimited control over the land and naval forces in the East, and with proconsular power in the whole of Asia as far as Armenia; so that Pompey now wielded the most extensive authority hitherto conferred by law upon a Roman citizen, with the exception of Sulla. The aristocratic party naturally looked upon him with more jealousy and distrust than ever, while in the estimation of the people he was the foremost man in Rome. In the summer of 66 he assumed the command of the army of the East, and pushing forward with rapidity surprised and totally defeated Mithridates in Lesser Armenia. For the next four years his career was one of uninterrupted success. All eastern Asia Minor was subjected to the Roman sway, and Armenia, the southern Caucasus, Mesopotamia, Syria, Phœnicia, and Judea were either made tributaries to the republic or were reduced to the condition of conquered provinces. In 63 Mithridates, a fugitive in the Tauric Chersonesus, after vain endeavors to unite the barbarous tribes of eastern Europe against Rome, put an end to his life; and Pompey, who had taken Jerusalem and was meditating new conquests in the remote East, led back his troops to the Euxine, and at Sinope honored the remains of his adversary with a royal funeral. Early in 62 he left Asia, and proceeding by slow marches reached Rome at the end of a twelvemonth, bringing with him an immense train of royal and noble captives, and an almost fabulous amount of eastern spoils. His third triumph, lasting two days, was celebrated Sept. 29 (the anniversary of his birth) and 30, 61. Almost immediately afterward he met with a rebuff from the senate, who refused to ratify his measures in Asia without detailed examination, and to make an assignment of the lands he had promised to his veterans, a promise which the senate had in a general way confirmed. This widened the breach between Pompey and the aristocracy, and hastened the downfall of both. Pompey found a friend in Cæsar. They agreed to support each other in their prominent public measures; and Crassus, formidable from his great wealth and aristocratic connections, joined the coalition, which is known as the first triumvirate. In the succeeding year, 59, Cæsar entered upon his first consulship, and secured for Pompey the ratification of his acts in Asia, and also by his agrarian law enabled him to make good his promises to his soldiers. At the same time he gave him his daughter Julia in marriage, Pompey having shortly before divorced his wife Mucia. Pompey now surrendered himself to the pleasures of domestic life, with little care for the machinations of his enemies, or regard for the welfare of his friends. Cicero, his panegyrist, was allowed to go into exile; and only when his own life was threatened by the enemies of the orator did Pompey make an effort to procure his recall. In gratitude for this Cicero proposed Pompey for the office of *præfectus annonæ* for five years, and the senate passed a law to that effect. Notwithstanding he was enabled to cheapen the price of corn in Rome, he found that his influence was waning at home, and that he had gradually lost the confidence of all parties. Exasperated by the attacks of Clodius, Cato, and others, who, he charged, were acting at the instigation of Crassus, he went in 56 to Cæsar's winter quarters at Lucca, where he was reconciled to Crassus, and the triumvirate was ratified anew, the agreement being that Pompey and Crassus should be consuls during the ensuing year and obtain provinces and armies, while Cæsar was to have his government of Gaul continued for five years. Accordingly, in 55, after some opposition, Pompey and his colleague were inducted into office, and the former endeavored to regain the popular favor by an exhibition of gladiatorial shows and combats of wild beasts in a large theatre he had constructed in the Campus Martius. The people soon began to express their discontent that Pompey should send his legates to Spain, the government of which province he had secured, instead of conducting the war there personally. For two years after the expiration of his consulship Pompey remained at home, and by secretly abetting intestine feuds promoted a state of anarchy which compelled the senate to invoke his assistance. He was made "consul without colleague," in reality dictator, in February, 52, and soon restored comparative order in the city. He now became the acknowledged head of the aristocracy. Various measures were at once brought forward to check the designs of Cæsar, whose influence with the people was steadily increasing; and on his announcing his intention to stand for the consulship for the year 48, Pompey and the aristocracy demanded that he should present himself in Rome as a candidate for the office. Cæsar declined to place himself in the power of his enemies, but agreed to resign his offices and command if Pompey would do the same. As this proposition was unpalatable to the senate, a decree was passed in January, 49, by which Cæsar was required to disband his army before a specified time, under penalty of being declared an enemy to the republic. Cæsar immediately crossed the Rubicon and marched upon Rome. Pompey, confident of his capacity to raise any number of troops which the exigencies of the state might demand, had taken no measures to provide against this movement; and when Cæsar with his veteran legions, trained in the wars of Gaul, was at the city gates, he found himself utterly unable to offer resistance, and with the consuls and the greater part of the senate and aristocracy fled to Brundusium. Being vigorously followed, he crossed the Adriatic, and at Dyrrhachium, on the coast of Illyria, assembled a numerous army. Early in 48 Cæsar, having conquered Pompey's legates in Spain, arrived in Epirus, with forces less numerous than those of his antagonist, but greatly superior in discipline. He manœuvred in vain to draw Pompey from his position; the latter was bent upon weakening his enemy without risking a battle. But the clamorous impatience of the Roman nobles and senators thwarted his purpose, and when Cæsar, after a severe check at Dyrrhachium, was compelled through failure of supplies to direct his march into Thessaly, Pompey was urged against his better judgment to follow and give him battle on the plains of Pharsalia. His army was completely routed by Cæsar's veterans, and he himself fled with a few friends to Lesbos, whence he went to Pamphylia, where a number of his party with ships and troops joined him. Being advised to seek an asylum with the young king of Egypt, to whose father he had rendered signal services, he arrived off the coast of that country and disembarked in a small boat with a few attendants. The chief officers of the king, who were awaiting him on the shore, had determined, as a means of propitiating Cæsar, upon putting him to death; and as he was about to leave the boat Septimius, who had been one of his centurions and was now in the service of the king of Egypt, stabbed him in the back. The rest then drew their swords, and Pompey, seeing that resistance was hopeless, covered his face with his toga and was despatched upon the spot. His body was cast out naked on the shore, where it was buried by a freedman, and his head sent to Cæsar, who wept upon beholding it, and put his murderers to death. In private life Pompey was temperate and frugal, and was a kind and indulgent husband. He was married five times, his last wife, Cornelia, surviving him. **II. Cneius**, eldest son of the preceding by his third wife, Mucia, born between 80 and 75 B. C., killed in Lauron on the Spanish coast in 45. His first important military service was in the war between his father and Cæsar. After the battle of Pharsalia he was left in possession of a formidable fleet, and in 47 began to take active measures to renew the war. He collected an army of 13 legions in Spain, whither in the latter part of 46 Cæsar followed him. He was totally defeated in the desperate battle of Munda, March 17, 45, and shortly after was overtaken and killed. **III. Sextus**, brother of the preceding, born in 75 B. C., killed at Miletus, Asia Minor, in 35. After the defeat at Munda he assembled a considerable force of fugitives and malcontents, with whom he defeated Asinius Pollio, the Roman legate, and acquired possession of Bætica and other portions of Spain. So formidable did he become, that the senate voted to allow him to return to Rome and to indemnify him for the confiscation of his father's possessions. The formation of the second triumvirate defeated this project, and Sextus, being included among the murderers of Cæsar, although he had not participated in the deed, and declared an outlaw, made a descent upon Sicily, which was speedily reduced. He now for years harassed his enemies by cutting off their supplies of provisions from Sicily, and in 42 he defeated in the straits of Sicily a fleet sent against him by Octavius. During the campaign of the triumvirs against Brutus and Cassius he remained inactive, but subsequently the vigilance of his fleet in intercepting the supplies of corn destined for Rome produced such a scarcity in the capital, that the populace rising in insurrection demanded that peace should be concluded with him. By this peace Sextus obtained the provinces of Sicily, Sardinia, Corsica, and Achaia, and 17,500,000 denarii for his private fortune. Antony refusing to give up Achaia, Sextus recommenced his piracy; and Menas, his general, having surrendered Sardinia and Corsica, Octavius ventured upon another war. It began with signal advantages to Sextus, whose admirals in 38 twice defeated the fleets of Octavius; but again by his inactivity he let the moment for decisive action slip by, and quietly permitted his enemies to equip new armaments. In the summer of 36 three large fleets sailed from different points upon Sicily, but were so shattered by a storm that the attack proved abortive. With fatal infatuation Sextus again allowed Octavius to recover from this disaster, and in September of the same year the triumvir's fleet, commanded by M. Vipsanius Agrippa, completely defeated his own in a fight off Naulochus on the coast of Sicily. He fled to Asia Minor, and, after vain endeavors to wrest the eastern provinces from Antony, was captured and put to death by the triumvir's legate, M. Titius.

POMPONIUS MELA. See MELA.

POMPTINE MARSHES. See PONTINE MARSHES.

PONCAS, a tribe of Indians in Dakota territory, a branch of the Dakota family. They were originally part of the Omahas, and resided on the Red river of the North. Here they were attacked by the Sioux, and, after losing greatly in numbers, emigrated beyond the Missouri, and built a fortified village on Ponca river. They united for a time with the Omahas, but have generally kept apart. Their constant pursuit by the Sioux kept them wandering and reduced them to a very wretched condition. At the beginning of this century their numbers were very small, but after the coming of Lewis and Clarke, and the treaties of June 28, 1817, and June 9, 1825, they rallied rapidly. In 1822 they were estimated at 750, and this has since been their average population. Then a large majority were women, the men having been cut off during the long hunts on which they mainly depended. They claimed the land from Iowa creek to White Earth river. On March 12, 1858, they sold their lands to government and went on a reservation near the Yanktons. The compensation, in instalments, was to be $185,000, with the support of a school and agricultural aid. But their crops failed, and they were killed by Sioux parties and even by soldiers. A new treaty, March 10, 1865, gave them a reservation of 576,000 acres of bottom lands, near the junction of the Missouri and Niobrara, where they formed three villages. They had no arms for hunting or defence; there was no game on the reservation, and agriculture, from floods and locusts, had been frequently a failure. In the distribution of agencies the Poncas were assigned to the Protestant Episcopal church. Soldiers were sent in 1874 to protect them. They then numbered 730, 132 being half-breeds.

PONCE, Pedro, a Spanish Benedictine, born in Valladolid about 1520, died at the convent of Ona, in Old Castile, in 1584. He is believed to have been the first instructor of deaf mutes in articulation. (See DEAF AND DUMB, vol. v., p. 780.) Sir Kenelm Digby's account of Ponce and his method is supposed to have been the means of calling the attention of Wallis and Holder, and perhaps also of Dalgarno, to the education of deaf mutes. Ponce wrote a treatise in Spanish, now lost, in which he explained his methods, and laid down rules for the instruction of the deaf and dumb.

PONCE DE LEON, Juan, a Spanish discoverer, born in Leon about 1460, died in Cuba in 1521. He distinguished himself in several campaigns against the Moors of Granada, and, accompanying Columbus on his second expedition in 1493, became commander of the eastern province of Hispaniola. He made an expedition to Porto Rico in 1508, and in 1509 finally reduced the island, which he governed with severity till the family of Columbus caused his removal. He was then advanced in years; but his love of adventure being still strong, and he having heard of the existence of a fountain which could restore youth and beauty, he set out from Porto Rico in search of it, March 3, 1513, and, after visiting most of the Bahamas, he descried on Easter Sunday land which he took to be an island, and to which, from the magnificence of the vegetation and from the day of its discovery (Span. *Pascua Florida*), he gave the name of Florida. On April 8 he landed some miles N. of the present site of St. Augustine, and took possession of the country in the name of the king of Spain. He spent several months in cruising, doubled Cape Florida, sailed among the group called by him Tortugas, and finally returned to Porto Rico, leaving behind one of his followers to continue the search. In 1513 he went to Spain and was appointed governor of Florida; but he was not able to undertake its colonization till 1521, when he was severely wounded by the natives, and withdrew at once to Cuba.

PONCE DE LEON, Luis (usually called in Spanish Fray LUIS DE LEON), a Spanish lyric poet, born in Granada about 1527, died in Madrigal, Aug. 23, 1591. He entered the Augustinian order at the age of 16, became licentiate in theology in 1560, and doctor of divinity shortly afterward, and at the age of 34 obtained a professorship of theology at Salamanca, where he himself had studied. Ten years later he was made professor of sacred literature. For the benefit of some friends he made a literal version of the Canticles into Castilian; and the manuscript falling into the hands of his enemies, he was brought before the inquisition of Valladolid in 1572, on a charge of Lutheranism. He was fully reinstated in December, 1576. His original productions, which stand at the head of Spanish lyrical and heroic poetry, are few but remarkable alike for elevation of style and purity of diction; the best are *La profecia del Tajo*, *La vida retirada*, *La immortalidad*, *La noche serena*, and *La Ascension*. They were first published by his friend Quevedo in 1631. His most popular prose work is his *Perfecta casada*, or "Perfect Wife," a treatise in the form of a commentary on portions of the book of Proverbs. Among his other prose works are the *Exposicion de los Salmos* and *De los nombres de Cristo*. The best edition of his works is that of Madrid (6 vols., 1804–'16).

PONCELET, Jean Victor, a French geometrician, born in Metz, July 1, 1788, died in December, 1867. He studied at the polytechnic school, and served as a lieutenant of engineers in the Russian campaign of 1812, when he fell into the hands of the enemy, and was detained as a prisoner at Saratov until the end of the war. He employed his time in researches relating to descriptive geometry, and returned to France with his health greatly impaired. During the next 15 years he was professor at the artillery school in Metz, and subsequently at the Sorbonne and the collége de France; and he was at the head of the polytechnic school from 1848 to 1850, with the rank of general. He bequeathed 2,500 francs to the academy of sciences as a prize for the best work on mathematics. He invented hydraulic wheels known by his name. The academy awarded a prize in 1825 to his treatise entitled *Les roues hydrauliques verticales, à aubes courbes, mues par dessous.* His other writings comprise, besides his contributions to Gergonne's *Annales de mathématique* (1817–'21), treatises *Sur les propriétés projectives des sections coniques*, *Sur les propriétés projectives des figures*, and *Sur les centres des moyennes harmoniques* (1822), and *Applications d'analyse et de géométrie* (2 vols., 1862–'4; revised ed., 1865).

POND, Enoch, an American clergyman born in Wrentham, Mass., July 29, 1791. He graduated at Brown university in 1813, studied theology with Dr. Emmons of Franklin, was licensed to preach in June, 1814, and was ordained pastor of the Congregational church in Ward (now Auburn), Mass., March 1, 1815. In 1828 he became the conductor of the "Spirit of the Pilgrims," an orthodox monthly publication just established in Boston, which bore an important part in what is known as the "great Unitarian controversy." After editing five volumes of this work, he became in September, 1832, professor of systematic theology in the seminary at Bangor, Me. In 1856 he resigned this chair, and became president, professor of ecclesiastical history, and lecturer on pastoral duties. Since 1870 he has been president and emeritus professor. His lectures have been published under the titles "Pastoral Theology" (12mo, 1866), "Christian Theology" (8vo, 1868), and "History of God's Church" (8vo, 1871). The two last named works have passed through several editions. He has also published "Plato, his Life, Works, Opinions, and Influence" (1846); "Swedenborgianism Reviewed" (1846; revised ed., "Swedenborgianism Examined," 1861); "The Ancient Church" (1851); memoirs of President Samuel Davies, Susanna Anthony, Count Zinzendorf, Wycliffe, John Knox, and the Rev. Harrison Fairfield; a "Life of Increase Mather and Sir William Phipps" (1847); a "Prize Essay on Congregationalism" (1867), &c. He edited Norton's "Life of John Cotton" (1832–'4).

POND, John, an English astronomer, born about 1767, died at Blackheath, Sept. 7, 1836. He studied under Wales, who had been astronomer to Capt. Cook's expedition, and at Trinity college, Cambridge. Settling at Westbury near Bristol, he made a series of observations from which he deduced that the quadrant then in use in Greenwich for the determination of declinations had changed its form since 1750; and this result was verified by measurement. In 1807 he removed to London, and in 1811 was appointed astronomer royal. He had only a superficial knowledge of mathematics, but was an exact and diligent observer, and devoted his attention chiefly to determining the places of the fixed stars. He invented the method of observing in groups, and was the first astronomer who advocated the now universal practice of depending upon masses of observations for all fundamental data. He translated La Place's *Système du monde*, and in 1833 published a catalogue of fixed stars, which was much the most perfect of its time. He retired upon a pension in 1835.

PONDICHERRY, a town on the Coromandel coast, capital of the French possessions in India, 85 m. S. by W. of Madras; pop. about 51,000. It is at the mouth of a small river accessible by vessels of light draught. Previous to the war of 1756, during which it was destroyed by the English, it was one of the finest cities in India. The European quarter is well laid out along the shore, and is separated from the native town by a ditch crossed by several bridges. There are large bazaars, two churches, a lighthouse, several schools, and a college for European children. It is the seat of a Roman Catholic vicar apostolic. The territory annexed to Pondicherry has an area of 112 sq. m., and in 1869 had a population of 131,806. It is surrounded by the British province of South Arcot, and is not very fertile. There is no harbor, but vessels anchor on the open coast, where at all times a heavy sea rolls in, and the surf is almost as dangerous as at Madras. The value of both imports and exports is about $8,250,000 per annum.—The settlement was purchased by the French from the Bejapoor rajah in 1672. It was captured by the Dutch in 1693, but given up at the peace of Ryswick; and taken by the British in 1761, 1778, 1793, and 1803, but each time restored at the conclusion of hostilities. When it was last given up by the English (1814), it was stipulated that no European soldiers should be landed at Pondicherry, and no fortifications constructed.

POND LILY. See WATER LILY.

PONGO. See ORANG-OUTANG.

PONIATOWSKI, the name of a Polish family of Italian origin. Giuseppe Salinguerra, a member of the Italian family of Torelli, settled in Poland about the middle of the 17th century, and there assumed the name of Poniatowski from the estate of Poniatów, belonging to his wife, who was the daughter of Albert

Poniatowski and Anna Leszczynska. The following are the most distinguished of his descendants. **I. Stanislaw**, born in 1677, died in 1762. He attached himself to the fortunes of Stanislas Leszczynski and his protector Charles XII., accompanied the Swedish army to Russia, and was at the battle of Poltava (1709), after which he was ambassador to Constantinople, and while there was skilful enough to involve the sultan in a war with Russia. After the death of Charles he supported Augustus II., by whom he was raised to several offices. Upon the death of Augustus (1733) he again joined the fortunes of Stanislas Leszczynski, and was taken prisoner at Dantzic by the Russians. He wrote *Remarques d'un seigneur polonais sur l'Histoire de Charles XII. par Voltaire* (the Hague, 1741). **II. Stanislaw August**, son of the preceding and of a princess Czartoryska, born in Lithuania, Jan. 17, 1732, was elected king of Poland in September, 1764, and died in St. Petersburg, Feb. 12, 1798. (See POLAND.) **III. Józef Antoni**, prince, and marshal of France, nephew of the preceding, born in Warsaw, May 7, 1762, drowned in the river Elster, Oct. 19, 1813. He entered the Austrian army, was in the campaign of 1787 against the Turks, and in 1789 was made a major general in the Polish army. In the war against Russia in 1792 he commanded on the Bug, and when the king, his uncle, acceded to the confederation of Targovitza, he left the service with most of the best officers; but when Kosciuszko raised the standard of revolt in 1794, he served under him as a volunteer, although in the campaign of 1792 Kosciuszko had been below him in military rank. In command of a division he performed effective service during the two sieges of Warsaw, and after the capitulation of that city he went to Vienna. In 1798 he returned to Warsaw, then under the dominion of Prussia, lived on his estates as a Prussian subject, and upon the occupation of that city by the French he joined their army, and during the campaign of 1807 commanded the Polish national army against the Russians. By the peace of Tilsit the duchy of Warsaw was created, and Poniatowski became its minister of war. In the war between Austria and France in 1809, he was compelled to evacuate the duchy, but invaded Galicia, and terminated the campaign by the occupation of Cracow. In the invasion of Russia in 1812 he commanded the Polish auxiliaries of the grand army. Just before the battle of Leipsic he was made by Napoleon a marshal of France, and after the battle was intrusted with the duty of covering the retreat of the French. The enemy had gained possession of the suburbs of the city, when with a small retinue he plunged into the deep stream of the Elster, in which he disappeared. His body was recovered five days after. **IV. Joseph**, prince, a composer, second cousin of the preceding, born in Rome, Feb. 20, 1816, died in London, July 3, 1873. He was educated in Rome and Florence, joined the French army in Algeria, and in 1848 settled in the latter city. The grand duke of Tuscany gave him the right of citizenship and the title of prince of Monte Rotondo. He was twice returned to the Tuscan chambers, and was minister of Tuscany in Brussels and London. In 1854 he settled in France, and was naturalized and made a senator. In 1870 he removed to London, where he supported himself by his musical talents during the last three years of his life. He composed *Ruy Blas*, *Esmeralda*, *Pierre de Médicis*, *Don Desiderio*, and other operas, and several masses. The last named opera was reproduced at the Théâtre Italien in Paris in 1867. He had a fine tenor voice, and in his early life appeared several times upon the stage.

PONS, Jean Louis, a French astronomer, born at Peyre, in Dauphiny, Dec. 25, 1761, died in Florence, Oct. 14, 1831. In 1789 he became connected with the observatory of Marseilles as usher, and rose to be director of the institution. In 1819 he became superintendent of the observatory at Marlia in the duchy of Lucca, and in 1825 of that of the museum at Florence. From 1801 to 1827 he discovered 37 comets.

PONSARD, François, a French dramatist, born in Vienne, June 1, 1814, died at Passy, Paris, July 13, 1867. He studied and practised law, and early translated Byron's "Manfred" into French verse, and also published original poems. His tragedy *Lucrèce*, rejected by Rachel and the Théâtre Français, was performed in 1843 at the Odéon, and made him famous as a restorer of classical dramatic art. His *Agnès de Méranie* (1846), *Charlotte Corday* (1850), and other pieces, were less adapted for the stage. Immediately after the *coup d'état* of Dec. 2, 1851, he accepted the office of librarian to the senate, for which he was taunted by Taxile Delord, with whom he consequently fought a duel. To show that he had not been prompted by mercenary motives, he wrote the comedy *L'Honneur et l'argent*, which was highly successful. He was admitted to the academy in 1855. His *Œuvres complètes* appeared in 1866, in 2 vols., and his *Galatée* in 1867. A monument was erected to him in 1869.

PONSON DU TERRAIL, Pierre Alexis de, viscount, a French novelist, born at Montmaur, near Grenoble, July 8, 1829, died in Bordeaux, Jan. 30, 1871. He early became known as a sensational writer, and his novels, amounting to hundreds of volumes, had a large circulation among the populace, and have been translated into foreign languages. Among the best known of them are *Les drames de Paris*, comprising *Les exploits de Rocambole* and other stories relating to that personage, which he dramatized under the same title in conjunction with Anicet-Bourgeois.

PONTA DELGADA, a town on the S. side of the island of St. Michael (São Miguel), one of the Azores, in lat. 37° 40′ N., lon. 25° 36′ W.; pop. in 1863, 15,885. It is tolerably well built and substantial, and is defended on the sea side by the castle of São Braz, and about 3 m. E. by the forts of São Pedro and Rosto de Cão. The harbor is so shallow that vessels require to be loaded outside by means of lighters. Wheat, maize, and oranges are the chief exports.

PONT-À-MOUSSON, a town of France, in the department of Meurthe-et-Moselle (before 1871 in that of Meurthe), on the left bank of the Moselle, here spanned by a stone bridge, 16 m. N. N. W. of Nancy; pop. in 1872, 8,211. The town has large cavalry barracks, and trades in grain, wine, coal, and timber. Beet sugar, pottery, woollens, and other goods are manufactured. From 1572 till the latter part of the 18th century it had a university.—The bulk of the second German army under Prince Frederick Charles crossed the Moselle at Pont-à Mousson Aug. 14, 1870, and the king arrived two days later. Extensive lazarettos existed here during the war. The Germans evacuated the place Aug. 2, 1873.

PONTCHARTRAIN, a salt-water lake in the S. E. part of Louisiana, so called in honor of Count Pontchartrain, a minister of Louis XIV. The lake is about 40 m. long from E. to W., and 24 m. wide from N. to S. It is connected with Lake Borgne on the east by the Rigolets, a narrow winding strait, and with Lake Maurepas on the west by the bayou Manchac. Its S. shore borders on New Orleans; and the bayou St. John, a small tributary, extends into that city. The lake is nowhere more than about 20 ft. deep, yet through it is carried on most of the coasting trade between New Orleans and the eastern gulf ports. Steamboats and small vessels pass from the lake to the heart of the city through two canals, each terminating in an artificial basin. The northern shores of the lake are more elevated than the southern, and afford sites for country seats and summer resorts. Among these are the villages of Madisonville and Mandeville.

PONTE, Da. See BASSANO, and DA PONTE.

PONTE CORVO, a town of S. Italy, in the province of Caserta, on the Garigliano, 50 m. N. W. of Naples; pop. of the commune about 11,000. It was acquired by Pope Julius II., and with a small territory formed a principality, which belonged to the papal see till 1860. From 1806 to 1810 it was held by Bernadotte with the title of prince of Ponte Corvo. The town is the seat of a bishop.

PONTEFRACT, or **Pomfret,** a town of England, in the West Riding of Yorkshire, 160 m. N. W. of London; pop. in 1871, 5,372. The restored church of All Saints has a fine tower. There are a subscription and a mechanics' library, a fine market hall opened in 1860, and a large workhouse built in 1864. In the vicinity are celebrated gardens and nurseries, coal mines, and flour mills. Liquorice is largely produced. Earthenware, iron and brass castings, hats, and other articles are manufactured. Remains exist of the ancient castle, the scene of the murder of Richard II. and of other remarkable events.

PONTIAC, the N. W. county of Quebec, Canada, separated from Ontario on the southwest by the Ottawa river; area, 20,798 sq. m.; pop. in 1871, 16,547, of whom 8,649 were of Irish, 3,530 of French, 1,981 of Scotch, and 964 of English origin or descent, and 1,217 were Indians. The surface is covered with extensive forests, and lumbering is the chief business. Capital, Bryson.

PONTIAC, a city and the county seat of Oakland co., Michigan, on the Clinton river, and on the Detroit and Milwaukee railroad, 26 m. N. W. of Detroit; pop. in 1870, 4,867; in 1875, about 5,000. It contains several fine residences, and has a handsome union school building, which cost $70,000. Its trade and manufactures are important. The principal establishments are two founderies, two breweries, three carriage factories, five flouring mills, two marble works, three planing mills, a plaster mill, a pump factory, a tannery, three wagon factories, a manufactory of turbine water wheels, and a woollen mill. There are five grain elevators, three banks, seven hotels, graded public schools, two weekly newspapers, and seven churches. Pontiac was settled in 1818, incorporated as a village in 1857, and as a city in 1861. A new state insane asylum is now in process of construction at Pontiac; $400,000 have been appropriated for the purpose, and it will be one of the finest edifices in the state.

PONTIAC, a North American Indian, chief of the Ottawas, an Algonquin tribe, born about 1712, killed in 1769. He was first known as an ally of the French. In 1746, at the head of a body of Indians, mostly Ottawas, he successfully defended Detroit, then a French possession, against the attacks of some hostile northern tribes. He is believed to have led several hundred Ottawas at Braddock's defeat in 1755. The Indians at that time were fond of the French, and hated the English; their discontent was increased by injudicious usage, and trivial conspiracies began to be formed. Pontiac finally determined to concentrate the hatred of all the western tribes in one great effort to drive out the English. At the end of 1762 he sent messengers to the different nations, proposing that in May, 1763, they should rise, massacre the English garrisons, and fall upon the frontier settlements. The plot was generally successful. Pontiac had reserved for himself the attack upon Detroit, but before it was made his intention was discovered. He then regularly besieged the place, and neglected no expedient that savage warfare could suggest to take it. To obtain food for his warriors he issued promissory notes, drawn upon birch bark and signed with the figure of an otter, which were all redeemed. After the siege had continued several months it was raised, and the tribes generally sued for peace. But Pontiac was not yet subdued. He endeavored to stir up the Indians on the Miami and in other parts of the west, and applied for aid, though in vain, to the French commander at

New Orleans. He at last made a stand in the Illinois country, where for a time he had the active coöperation of the French fur traders; but even his more immediate followers fell away from him, and he then accepted the peace which the English offered. From this time he had no importance, and in 1766 he formally submitted to the English rule. He was killed by an Illinois Indian at Cahokia, opposite St. Louis, while drunk.—See "History of the Conspiracy of Pontiac," by Francis Parkman (Boston, 1851).

PONTIFEX, in ancient Rome, the title of a priest. The office of pontifex is said to have been created by Numa. The pontifices were not attached to the worship of any particular divinity, but were a college of priests superior to all others, and superintended the whole public worship. In 300 B. C. the plebeians obtained the privilege of representation in the college, and the whole number was increased to 9. The number was further increased by Sulla to 15, and by Cæsar to 16. The pontifices held office for life. On the death of a pontifex a successor was chosen, originally by the college of priests, but in 104 B. C. this election was given to the people by the *lex Domitia*, though the confirmation by the college was still requisite as a matter of form. The college of priests had the superintendence of religion, kept the books of ritual ordinances, and were required to give information to any one who might consult them on sacred matters. It was their duty to guard against irregularity in the observance of religious rites, and to determine everything in relation to burials, and how the manes of the departed should be appeased. Over all classes they had the power of judicial decision and punishment in matters of religion, could make new laws and regulations, and were themselves entirely irresponsible. The *pontifex maximus* was the president of the college, and acted in its name. He was obliged to live in a *domus publica*, and was not allowed to leave Italy. This latter law was first violated in 131 B. C., and afterward was never very strictly observed. A pontifex might hold any other office, civil, military, or priestly, provided it did not interfere with his pontifical duties. There are several instances in which the offices of pontifex maximus and consul were held in conjunction. The office was assumed by Augustus, and was held by all his successors until Gratian, who declined it. The title appears on some of the coins of the emperors. The college of pontifices existed until the final overthrow of paganism, though it had retained in its latter years but very little of its ancient power or respect.

PONTIFICAL STATES. See PAPAL STATES.

PONTIGNY, a village of France, in the department of Yonne, about 18 m. S. E. of Auxerre; pop. about 800. It is celebrated for a magnificent abbey, originally Cistercian, founded in 1150 by Thibaud, count of Champagne. It became the asylum of Thomas à Becket in 1164, of Stephen Langton and the principal English bishops in 1208, and about 1239 of Archbishop Edmund Rich, who spent two years there, and whose shrine was visited by numbers of pilgrims during the middle ages. The abbey and church were burned by the Huguenots in 1568. Of the former one side of the cloister still remains, with vast underground apartments. It has been repaired and enlarged, and is now occupied by the Dominicans. The church, a Gothic building of the 14th century, is 360 ft. long, 73 wide in the nave and 150 in the transept, with an interior height of 70 ft. Around the apse are 11 chapels, all of which formerly contained richly sculptured tombs. It was partially restored in 1615, ranks as a national monument, and is undergoing a complete restoration at the expense of the government. Of late years Pontigny has once more become a resort of Roman Catholic pilgrims from England, 300 of whom, under Archbishop Manning, visited the church together on Sept. 3, 1874.

PONTINE MARSHES, a low marshy plain in the S. part of the Campagna of Rome, extending 28 m. along the Mediterranean coast from Cisterna to Terracina. Its breadth varies from 4 to 11 m. These marshes are formed by the stagnation of the waters of the numerous streams which flow down the Volscian mountains or take their rise in springs at their foot, and are prevented from finding an outlet to the sea by the low level of the plain and the accumulation of sand upon the coast. The name of the marshes was derived from Suessa Pometia, a Volscian town on their borders, which about 500 B. C. disappeared from history, and the position of which is not now known. Various attempts were made by the Romans to drain the marshes. As early as 312 B. C. the Appian way was carried through this district, and with it a canal from Appii Forum to Terracina. In 160 B. C. a part of them was drained with apparent success by the consul Cornelius Cethegus; but the tract soon reverted to its original condition. Its drainage was again projected by Julius Cæsar, and Augustus made some temporary improvements. Trajan restored the Appian way. During the wars preceding the downfall of the Roman empire the marshes were neglected. Boniface VIII. drained the district about Sezze and Sermoneta by a large canal; and in 1417 Martin V. had a canal, called the Rio Martino, dug to within a mile of the sea, but the project was abandoned at his death. The district was granted by Leo X. to the Medici, upon the condition of their draining it, and it remained in their hands 69 years, during which time scarcely anything was done toward its improvement. A large canal, called the Fiume Sisto, was dug during the reign of Sixtus V.; but after his death in 1590 the dams gave way, and the country was again flooded. Pius VI. directed his attention to draining the marshes, and from 1777 to 1796 he expended $2,000,000 in the work. A part of the Appian way was restored, the road was continued across the marshes, and the canal attributed to Augustus was again opened under the name of Linea Pia. It has been found almost impossible, however, to reclaim the waste land, although there is a small portion under cultivation, and large pastures abound, where horses, cattle, and buffaloes graze.

PONTMARTIN, Armand Augustin Joseph Marie de, a French author, born in Avignon, July 16, 1811. He studied at the collége Saint Louis in Paris, and early became known for his ultramontane and controversial zeal as a writer for the *Revue des Deux Mondes*. His various series of *Causeries littéraires* and *Causeries du Samedi* comprise 19 volumes (1854–'74). He also published *Contes et nouvelles* (1853), the best being *Aurélie; Le fond de la coupe* (1855); and several novels, including *Mémoires d'un notaire* (3 vols., 1849; new ed., 1869), and *La fin du procès* (1855; new ed., 1869). In 1872 appeared his *Le filleul de Beaumarchais*. His reputation rests on his critical writings.

PONTOISE (anc. *Briva Isaræ*), a town of France, in the department of Seine-et-Oise, at the junction of the Oise and the Viosne, 18 m. N. W. of Paris; pop. in 1872, 6,480. It is built in the shape of an amphitheatre extending from the Oise to the top of a rocky eminence, and contains handsome public buildings and a public park. An annual fair is held here Nov. 11 –13, on a plain near the bank of the Oise. There is a trade in grain, flour, and cattle. Chemical products and hosiery are made.—Pontoise was formerly fortified, and was the capital of the Vexin Français, with counts of its own. It was often the residence of the Capetian kings. During the mediæval wars it was twice taken by the English.

PONTOPPIDAN, Erik, a Danish author, born in Aarhuus, Aug. 24, 1698, died in Bergen, Norway, Dec. 20, 1764. He graduated in divinity at the university of Copenhagen, became professor of theology there in 1738, and bishop of Bergen in 1747. In 1730 he published a description of the geography, natural history, antiquities, &c., of Denmark, under the title of *Theatrum Daniæ Veteris et Modernæ*, and afterward treated the same subjects more fully in his *Danske Atlas, eller Kongeriget Dænemark* (7 vols. 4to, Copenhagen, 1763–'74). Among his other works are: *Gesta et Vestigia Danorum extra Daniam* (3 vols., Leipsic, 1740–'41); *Annales Ecclesiæ Danicæ* (4 vols., 1741–'52); *Glossarium Norvegicum* (Bergen, 1749); and *Det förste Forsøg paa Norges naturlige Historie* (1752), which has been translated into English. He was the first to give an account of the kraken.

PONTORMO, Il (JACOPO CARRUCCI), an Italian painter, born at Pontormo, Tuscany, in 1493, died in 1558. A pupil of Andrea del Sarto, he won the commendations of Michel Angelo and Raphael, whereupon his master from jealousy expelled him from his studio. But he did not fulfil the hopes of his admirers, and left but few historical pictures, the most valuable of which is the "Visitation of our Lady," in the Annunziata at Florence. In portraiture his works rank as masterpieces.

PONTOTOC, a N. county of Mississippi, watered by the Tallahatchee and Yalabusha and branches of the Tombigbee river; area, about 600 sq. m.; pop. in 1870, 12,525, of whom 3,012 were colored. It has an undulating surface and fertile soil. The chief productions in 1870 were 13,057 bushels of wheat, 371,719 of Indian corn, 31,408 of sweet potatoes, 4,524 bales of cotton, and 16,923 gallons of molasses. There were 2,229 horses, 1,533 mules and asses, 4,151 milch cows, 892 working oxen. 4,791 other cattle, 6,999 sheep, and 23,525 swine. Capital, Pontotoc.

PONTUS, an ancient division of Asia Minor, so named from its situation on the S. shore of the Pontus Euxinus, bounded N. E. by Colchis, S. E. and S. by Armenia Minor, Cappadocia, and Galatia, and W. by the river Halys, which separated it from Paphlagonia. The Iris and the Thermodon flowed through it into the Euxine. Among its towns were Trapezus (Trebizond), Cerasus, Cotyora, Polemonium, and Amisus, all on the coast. It was mountainous in the east, where the Chalybes had famous iron mines, and very fertile in the west and along the coast. The fruit of Pontus was renowned. It was the home of the Amazons, was visited by the Argonauts, and Greek colonies were established upon its coast as early as the 7th century B. C. Originally and under the Persians it formed part of Cappadocia. In the early part of the 4th century B. C. Ariobarzanes, the son of Mithridates, a Cappadocian satrap, rebelled, and made himself king of the coastland, which was henceforward designated as Pontus by Greek writers. In the reign of his son Mithridates the kingdom acquired political importance, and after the death of Alexander secured its independence. Under Mithridates the Great (VI., 120–63 B. C.) it was subdued by the Romans and dismembered (see MITHRIDATES), the eastern part being given again to its earlier savage owners, and the western annexed to Bithynia. A portion was subsequently made a sovereignty under Polemo, and the whole became a Roman province, A. D. 67. It is now embraced in the Turkish vilayets of Trebizond and Sivas.

PONTUS EUXINUS. See BLACK SEA.

POODLE (*canis aquaticus*), the barbet or water dog. It has a high and round head, large cavity for the brain, expanded frontal sinuses, long ears, compact body, and rather short legs. The hair is long, curly, black, white, or the two mixed, sometimes with rufous marks. The large variety stands 18 to 20 in. high at the shoulders, and has coarse curled hair, often shaved to represent a miniature lion; the muzzle is short and prominent, and the tail is rather short and somewhat erect. It has long been known to fishermen and sportsmen as an excellent water dog; the sense of smell is exquisite, which gives it a remarkable power of tracing out the lost property of its master; it is strong, intelligent, and affectionate. There is a diminutive breed, with longer and more silky and curly hair, generally white.

Poodle.

POOLE, a town and seaport of Dorsetshire, England, on a peninsula, 20 m. E. of Dorchester; pop. in 1871, 10,097. The principal street is a mile long, but the older part of the town is irregularly built. The parish church was rebuilt in 1812, and there are places of worship for many denominations, a custom house, a town hall, a guildhall, and the ancient king's hall or wool house. The harbor is a fine estuary about 6 m. long, connecting with the sea by a very narrow entrance. The quays and warehouses are extensive. About 500 coasting vessels annually enter the port, and nearly 200 ships are engaged in the foreign trade. The fisheries of plaice and herring are considerable, and there are large ship-building yards and manufactories of sail cloth, cordage, &c. The port is of great antiquity.

POOLE, John, an English dramatist, born about 1786, died near London, Feb. 5, 1872. He wrote "Hamlet Travestie" (1810); "Romeo and Juliet Travestie" (1812); "The Hole in the Wall," a farce (1813); "Who is Who" (1815); "A Short Reign and a Merry One," from the French (1819); "'Twould Puzzle a Conjurer" (1824); "Paul Pry," his most famous farce (1825; translated into German, Leipsic, 1863); "Turning the Tables" (1830); "A Nabob for an Hour" (1832); "Comic Sketch Book" (2 vols., 1835); "Patrician and Parvenu," a comedy (1835); "Atonement, or the Goddaughter," a play (1836); "Crotchets in the Air" (8vo, 1838); "Oddities of London Life" (2 vols., 1838); "Little Peddlington and the Peddlingtonians" (2 vols., 1839); "Phineas Quiddy, or Sheer Industry" (3 vols., 1842); "Comic Miscellany" (1844); and "Christmas Festivities," a collection of sketches, characters, and tales (1845). Several of his books have been republished in the United States. His farces were produced in the London theatres with Munden, Liston, Keeley, Cooper, and other celebrated comedians in the leading parts, and many of his pieces are still popular. During his last years, mainly through the exertions of Charles Dickens, Poole received a small pension from the civil list; but he outlived all his contemporaries, and died neglected and almost forgotten.

POOLE, Matthew, an English clergyman, born in York in 1624, died in Amsterdam in 1679. He was educated at Emmanuel college, Cambridge, took orders, and in 1648 was rector of St. Michael le Quern, London, but resigned upon the passage of the uniformity act in 1662. He engaged in the nonconformity controversies of his time, and wrote much in opposition to the Roman Catholic church. His last years were spent in Holland. His principal work is the *Synopsis Criticorum Biblicorum* (5 vols. fol., 1669-'76), a digest of the *Critici Sacri* (1660), presenting in a condensed form the views of 150 commentators.

POOLE, Paul Falconer, an English painter, born in Bristol in 1810. His first exhibition in the academy was "The Well, a Scene at Naples" (1830), and he was elected an associate in 1846, and an academician in 1861. Among his works are "Solomon Eagle exhorting the People to Repentance during the Plague of London" (1843); "The Beleaguered City" (1844); "Suppression of Sion Monastery" (1846); "Edward III.'s Generosity to the People of Calais" (1847), which gained a prize of £300 in the Westminster hall exhibition; "Arlète first discovered by Robert le Diable" (1848); three scenes from "The Tempest" (1849); "Job and his Friends receiving the Tidings of his Calamities" (1850); "The Goths in Italy" (1852); "Lighting the Beacon on the Coast of Cornwall at the appearance of the Spanish Armada" (1864); and "Imogen before the Cave of Belarius" (1866). Among his lesser works are "Margaret at her Spinning Wheel," from "Faust;" "The Song of the Troubadour" and "Philomena's Song by the Beautiful Lake," from the "Decameron;" "The Escape of Glaucus and Ione;" "The Last Scene in Lear;" "A Suburb of Pompeii;" "A Midsummer Night;" "The Market Girl;" "The Alehouse Door;" "The Mountaineers;" and "The Blackberry Gatherers."

POONAH, a town of British India, on the Moota, above its confluence with the Moola, in the province and 80 m. S. E. of the city of Bombay; pop. about 75,000. It is divided into seven quarters named after the days of the week, and the principal thoroughfares are macadamized. It contains the palace of the former Mahratta rulers, a government school with Sanskrit, English, and normal departments, united with the old Sanskrit college, a seminary for Hindoo girls, extensive water works, an English church with the tomb of Sir Robert Grant, governor of Bombay, who died in 1838, and the capacious and salubrious quarters of the English army, this being the most important military station in the Deccan. Poonah had double its present population and many noted branches of industry while it was the capital of the Mahrattas, whose final overthrow in 1819 was fatal to the town. But it has lately shown signs of improvement, and is connected by railway with Bombay. Paper is almost the only manufacture, and the arid soil of the vicinity is not favorable to production. It is the capital of the district of Poonah (area, 4,280 sq. m.; pop. in 1871, 792,352), a dry mountainous region, almost without trees, and watered chiefly by the Beemah and its affluents.

POOR, Daniel, an American missionary, born in Danvers, Mass., June 27, 1789, died in Manepy, Ceylon, Feb. 3, 1855. He graduated at Dartmouth college in 1811, and at the theological seminary at Andover in 1814. In October, 1815, he sailed for Ceylon in company with other missionaries, and reached Colombo in March, 1816. He went to Tillipally near Jaffna, studied the Tamil language, and in July, 1823, took charge of the mission seminary at Batticotta. In 1835 he went to Matura to aid in opening a new mission, and 37 schools were soon organized mainly through his agency. He returned to Tillipally in 1841, and there labored till 1848, when he visited the United States. Returning to Ceylon in 1851, he settled at Manepy. He died suddenly of cholera. He published several tracts in the English and Tamil languages.—His son, DANIEL W., was long the pastor of a Presbyterian church in Newark, N. J., and is now (1875) professor of ecclesiastical history in the Presbyterian theological seminary at San Francisco.

POOR, Little Sisters of the. See SISTERHOODS.

POPAYAN, an inland city of the United States of Colombia, capital of the state of Cauca, on the Rio Molino, 228 m. S. W. of Bogotá; pop. about 16,000. It is situated in a delightful plain about 2,500 ft. above the sea, in the vicinity of the volcanoes Puracé and Sotará, and overlooked by the wood-covered mountain M, so named from its shape. The streets are regular and are well kept; and the houses, mostly of sun-dried brick, are neat and well built. Among the public edifices, some of which are excellent, are the cathedral, several churches and hermitages, six convents, the episcopal palace, a hospital, and a mint founded in 1749. The educational institutions include a university, a college, and public and private schools. There are several public squares. Coarse woollen goods are manufactured. The traffic in precious metals, once flourishing, has of late years diminished considerably; and the city derives its chief importance from being the main commercial entrepot between Bogotá and Quito.—Popayan was founded in 1536 by Belalcázar. It has frequently suffered from earthquakes, particularly in 1827, when it was almost entirely destroyed by one, which was accompanied by an eruption of the volcano Puracé, and an inundation from the Cauca.

POPE. I. A N. W. county of Arkansas, bordered S. W. by the Arkansas river and W. partly by Big Piney creek, and drained by Illinois bayou and other streams; area, about 800 sq. m.; pop. in 1870, 8,386, of whom 575 were colored. It has a hilly surface and a fertile soil. The chief productions in 1870 were 21,363 bushels of wheat, 225,152 of Indian corn, 10,834 of oats, 6,306 of Irish and 8,114 of sweet potatoes, 42,797 lbs. of butter, and 3,070 bales of cotton. There were 1,461 horses, 1,897 milch cows, 3,745 other cattle, 3,826 sheep, and 15,137 swine. Capital, Dover. **II.** A S. county of Illinois, bordered S. E. by the Ohio river, which separates it from Kentucky, and intersected by Big Bay creek; area, 374 sq. m.; pop. in 1870, 11,437. It has a rolling surface, and the soil is a fertile sandy loam. The chief productions in 1870 were 70,457 bushels of wheat, 315,958 of Indian corn, 67,886 of oats, 58,826 of potatoes, 96,796 lbs. of butter, 19,334 of wool, and 122,693 of tobacco. There were 2,217 horses, 1,848 milch cows, 3,635 other cattle, 9,557 sheep, and 12,676 swine. Capital, Golconda. **III.** A W. county of Minnesota, drained by Chippewa river, a tributary of the Minnesota; area, 720 sq. m.; pop. in 1870, 2,691. It contains several lakes. The St. Paul and Pacific railroad passes through the S. W. corner. It has a rolling prairie surface and a fertile soil. The chief productions in 1870 were 53,721 bushels of wheat, 44,395 of oats, 20,528 of potatoes, 65,375 lbs. of butter, and 8,567 tons of hay. There were 360 horses, 3,081 cattle, 964 sheep, and 790 swine. Capital, Glenwood.

POPE (Gr. *παπά*, father), a title applied by the eastern Christians to all priests, and in the West originally given to all bishops, but now restricted to the bishop of Rome. The Roman Catholics regard the pope as the legitimate successor of St. Peter and the visible head of the church, the invisible head being Christ. He was anciently elected by the people of his diocese, but is now chosen by the cardinals, a vote of two thirds being required to elect. Both on account of the geographical position of Rome and of the union of temporal and ecclesiastical power in the person of its bishops, they have for several centuries been exclusively Italians. The last pope of foreign birth was Adrian VI. (1522), a native of Utrecht. According to Roman Catholic writers, the bishop of Rome has always been recognized as the superior of all other Christian bishops; but Protestant historians date his supremacy generally from about the 4th century. Much obscurity rests on the chronology of the popes of the first three centuries, more particularly of the 1st century. Linus is supposed by some authors to have been the vicegerent of Peter, as well as his successor; while Cletus and Anacletus are mentioned in some catalogues as one person, and in others as two distinct personages. There reigns also much confusion in the papal chronology of the 10th and 11th centuries, especially in placing the popes of the name of John. We subjoin a table of the popes, with figures indicating the beginning of each pontificate, both according to the Roman *Notizie* and the *Gerarchia Cattolica* of 1875, issued from the press of the Vatican; the former (being those used in our former edition and generally in our biographical articles) in parentheses where they differ from the latter. The names printed in Italics are those of antipopes.

St. Peter		42
St. Linus	(66)	67
St. Cletus		78
St. Clement I. (Clemens Romanus)	(91)	90
St. Anacletus		100
St. Evaristus	(100)	112
St. Alexander I	(108)	121
St. Sixtus I	(119)	132
St. Telesphorus	(127)	142
St. Hyginus	(139)	154
St. Pius I	(142)	158
St. Anicetus	(157)	167
St. Soterus	(168)	175
St. Eleutherius	(177)	182
St. Victor I		193
St. Zephyrinus	(202)	203
St. Calixtus		217
St. Urban I	(223)	227
St. Pontianus	(230)	233
St. Anterus	(235)	238
St. Fabian	(236)	240
St. Cornelius	(250)	254
St. Lucius — *Novatianus*	(252)	255
St. Stephen I	(253)	257
St. Sixtus II	(257)	260
St. Dionysius	(259)	261
St. Felix I	(269)	272
St. Eutychianus		275
St. Caius		283
St. Marcellinus		296
St. Marcellus I	(308)	304
St. Eusebius	(310)	309
St. Melchiades		311
St. Sylvester		314
St. Marcus		336
St. Julius I	(337)	341
St. Liberius		352
St. Felix II. (sometimes reckoned an antipope)	(355)	363
St. Damasus		366
St. Siricius		384
St. Anastasius	(398)	399
St. Innocent I		402
St. Zosimus		417
St. Boniface I. — *Eulalius*		418
St. Celestine I	(422)	423
St. Sixtus III		432
St. Leo I. the Great		440
St. Hilary		461
St. Simplicius		468
St. Felix III		483
St. Gelasius I		492
St. Anastasius II		496
St. Symmachus		498
St. Hormisdas — *Lawrence*		514
St. John I		523
St. Felix IV		526
Boniface II.—*Dioscorus*		530
John II	(533)	532
St. Agapetus I		535
St. Sylverius		536
Vigilius		537
Pelagius I		555
John III		560
Benedict (I.) Bonosus		574
Pelagius II		578
St. Gregory I. the Great		590
Sabinianus		604
Boniface III		607
St. Boniface IV		608
St. Adeodatus I		615
Boniface V		619
Honorius I		625
(See vacant 1 yr. and 7 mos.)		
Severinus		640
John IV		640
Theodorus I		642
St. Martin I		645
St. Eugenius I	(654)	659
St. Vitalianus		657
Adeodatus II		672
Donus or Domnus I		676
St. Agathon		678
St. Leo II		682
St. Benedict II		684
John V		685
Conon — *Theodorus; Paschal*		686
St. Sergius I		687
John VI		701
John VII		705
Sisinnius		708
Constantine		708
St Gregory II		715
St. Gregory III		731
St. Zachary		741
Stephen II. (died before consecration)		752
Stephen III		752
St. Paul I.—*Constantine; Theophylactus; Philip*		757
Stephen IV		768
Adrian I	(772)	771
St. Leo III		795
Stephen V		816
St. Paschal I		817
Eugenius II		824
Valentinus		827
Gregory IV		827
Sergius II		844
St. Leo IV		847
Benedict III.—*Anastasius*		855
St. Nicholas I the Great		858
Adrian II		867
John VIII		872
Marinus I. or Martin II.		882
Adrian III		884
Stephen VI		885
Formosus		891
Boniface VI. (reigned only 18 days, and not included among the popes by Baronius and others)		896
Stephen VII		896
Romanus		897
Theodorus II.—*Sergius III*		898
John IX		898
Benedict IV		900
Leo V		903
Christopher		903
Sergius III		904
Anastasius III		911
Lando		913
John X		914
Leo VI		928
Stephen VIII		929
John XI		931
Leo VII		936
Stephen IX		939
Marinus II. or Martin III.		943
Agapetus II		946
John XII.—*Leo VIII*		956
Benedict V		964
John XIII		965
Benedict VI		972
Donus or Domnus II		974
Benedict VII		975
John XIV		983
Boniface VII		984
John XV		985
John XVI		996
Gregory V		996
John XVII		999
Sylvester II		999
John XVIII		1003
John XIX		1003
Sergius IV		1009
Benedict VIII.—*Gregory VI*		1012
John XX		1024
Benedict IX		1033
Gregory VI. (abdicated in 1046) — *Sylvester III*	(1045)	1044
Clement II		1046
Damasus II.—*Benedict IX.* attempts to resume the throne		1048
St. Leo IX		1049
Victor II		1055
Stephen X		1057
Benedict X		1058
Nicholas II	(1058)	1059
Alexander II. — *Honorius II*		1061
St. Gregory VII.—*Clement III*		1073
Victor III	(1086)	1087
Urban II		1088
Paschal II		1099
Gelasius II.—*Gregory VIII*		1118
Calixtus II		1119
Honorius II		1124
Innocent II. — *Anacletus II.; Victor IV*		1130
Celestine II		1143
Lucius II		1144
Eugenius III		1145
Anastasius IV		1153
Adrian IV		1154
Alexander III.—*Victor V.; Paschal III.; Calixtus III.; Innocent III*		1159
Lucius III		1181
Urban III		1185
Gregory VIII		1187
Clement III		1187
Celestine III		1191
Innocent III		1198
Honorius III		1216
Gregory IX		1227
Celestine IV		1241
(See vacant 1 yr. and 7 mos.)		
Innocent IV		1243
Alexander IV		1254
Urban IV		1261
Clement IV		1265
(See vacant 2 yrs. and 9 mos.)		
Gregory X		1271
Innocent V		1276
Adrian V		1276
John XXI		1276
Nicholas III		1277
Martin IV		1281
Honorius IV		1285
Nicholas IV		1288
(See vacant 2 yrs. and 3 mos.)		
St. Celestine V		1294
Boniface VIII		1294
Benedict XI		1303
Clement V. (seat of the papacy removed to Avignon)		1305
(See vacant 2 yrs. and 3 mos.)		
John XXII		1316
Benedict XII.—*Nicholas V. at Rome*		1334
Clement VI		1342
Innocent VI		1352
Urban V		1362
Gregory XI. (throne restored to Rome)		1370
Urban VI. — *Clement VII*		1378
Boniface IX.—*Benedict XIII. at Avignon*		1389
Innocent VII		1404
Gregory XII		1406
Alexander V		1409
John XXIII		1410
Martin V. — *Clement VIII*		1417
Eugenius IV.—*Felix V.*		1431
Nicholas V		1447
Calixtus III		1455
Pius II		1458
Paul II		1464
Sixtus IV		1471
Innocent VIII		1484
Alexander VI		1492
Pius III		1503
Julius II		1503
Leo X		1513
Adrian VI		1522
Clement VII		1523
Paul III		1534
Julius III		1550
Marcellus II		1555
Paul IV		1555
Pius IV		1559
St. Pius V		1566
Gregory XIII		1572
Sixtus V		1585
Urban VII		1590
Gregory XIV		1590
Innocent IX		1591
Clement VIII		1592
Leo XI		1605
Paul V		1605
Gregory XV		1621
Urban VIII		1623
Innocent X		1644
Alexander VII		1655
Clement IX		1667
Clement X		1670
Innocent XI		1676
Alexander VIII		1689
Innocent XII		1691
Clement XI		1700
Innocent XIII		1721
Benedict XIII		1724
Clement XII		1730
Benedict XIV		1740
Clement XIII		1758
Clement XIV		1769
Pius VI		1775
Pius VII		1800
Leo XII		1823
Pius VIII		1829
Gregory XVI		1831
Pius IX		1846

POPE, Alexander, an English poet, born in London, May 22, 1688, died at Twickenham, Middlesex, May 30, 1744. His father was a Roman Catholic, who, having acquired a small fortune as a linen merchant, retired to Binfield in Windsor forest. Alexander inherited a crooked body and a sickly constitution. Having taught himself to write by copying out of printed books, he learned a little Greek and Latin from a priest, and was then sent to school, first at Twyford, where he was flogged for lampooning his master, and afterward in London, where he studied little but Dryden, Spenser, Waller, Ogilby's translation of Homer, and Sandys's translation of Ovid. Dryden was his master in the art of poetry; he had the warmest admiration for him, studied his works minutely, copied his style, and records that when about 12 years old he had a glimpse of the great poet, then in the last year of his life. Soon after this Pope went home to Binfield, and continued a course of self-education with diligence until he was 19 or 20. He taught himself French, Latin, and Greek, through the medium of translations. The earliest of his pieces extant is an "Ode on Solitude," written when he was about 12. From his 13th to his 15th year he was engaged upon "Alcander," an epic poem of which he had finished four books when he burned it. He also composed a comedy and a tragedy, which he destroyed, and gave promise of his satirical powers in some "Lines to the Author of a Poem entitled Successio" (Elkanah Settle), which were printed in 1712 by Lintot in a volume of "Miscellaneous Poems and Translations." His imitations of some of the English poets, translations of the first book of the *Thebais* of Statius, of Ovid's epistle from Sappho to Phaon and part of the "Metamorphoses," and of the fables of "January and May" and the "Wife of Bath" from Chaucer, belong to nearly the same period; but none of his youthful compositions were published earlier than his 21st year. About 1704 he was introduced by Sir William Trumbull to the veteran dramatist Wycherley, under whose auspices he made his first acquaintance with the coffee-house wits of London. Wycherley submitted his verses to the boy poet for correction; but the freedom with which Pope exercised his critical office resulted in a quarrel. Garth and Congreve were also among his early friends. In 1709 he established his position as the first poet of his time by the publication of his "Pastorals," written five years before. They appeared in the sixth volume of Tonson's "Poetical Miscellany," with the version of Chaucer's "January and May," and a translation of the episode of Sarpedon from the Iliad. He had already begun the "Essay on Criticism," which was published anonymously in 1711, and assailed by John Dennis with the most extravagant abuse, while Addison praised it in the "Spectator" (No. 253) as "a masterpiece in its kind." In the next year Pope contributed to the "Spectator" the "Messiah, a Sacred Eclogue." The first sketch of the "Rape of the Lock," a mere skeleton of what the poem afterward became, appeared in Lintot's collection of "Miscellaneous Poems and Translations" in 1712. It originated in a quarrel between two families of quality on account of the stealing of a lock of hair from the head of a reigning belle; Pope was urged "to write a poem to make a jest of it, and laugh them together again," and its literary success was such that the author determined to enlarge it. It was accordingly printed in 1714 with the addition of the supernatural machinery and a dedication to Miss Arabella Fermor, the heroine of the piece. In 1713 he went to London, where for a year and a half he studied painting under Jervas, a pupil of Sir Godfrey Kneller. He had a strong natural taste for the art, but his bad eyesight was an insuperable bar to success; and after throwing away "three Dr. Swifts, two Lady Bridgewaters, a duchess of Montague, half a dozen earls, and one knight of the garter," and executing a few pieces which have had a better fate, he returned to literature. In 1713 appeared his descriptive poem on "Windsor Forest," mostly written when he was 16 years old, the publication of which led to his intimacy with Swift and Arbuthnot, and an "Ode for Music on St. Cecilia's Day," which is unfortunate in provoking comparison with the composition of Dryden on the same subject. In the mean time Pope had made the acquaintance of Teresa and Martha Blount, young ladies of good family and nearly his own age. Martha, the younger, was his devoted friend through life and his principal heir. Her intercourse with him did not escape scandal, but it is now agreed that no imputations could be more unjust. Another of his friends was Gay; and Steele, who was one of the first to appreciate his genius, introduced him to Addison. For the first performance of Addison's "Cato" (1713) he wrote a prologue which was as popular as the tragedy itself; and when Dennis attacked the play he hastened to revenge his friend in a "Narrative of Dr. Robert Norris [a noted quack who pretended to cure lunatics] concerning the strange and deplorable Frenzy of J. D." Pope contributed to the "Guardian" several papers, including a sarcastic parallel between his own pastorals and those of his rival Ambrose Philips, whom Steele in the same publication had pronounced the legitimate successor of Spenser.—Pope had thus far been supported by a moderate allowance from his father; all his poetry together had not brought him £100. He now issued proposals for a poetical translation of the Iliad, to be published by subscription in six volumes at a guinea each; over 650 copies were subscribed for. But Pope was no master of Greek, and, with all the help of various translations, had at first such "terrible moments" that he wished a hundred times somebody would hang him. But as the work went on the task became lighter, and he fell into the method of translating 30 or 40 verses before he got up, and working upon it the rest of the morning. "My usual method," he says, "was to take advantage of the first heat, and then to correct each book, first by the original text, then by other translations, and lastly to give it a reading for the versification only." The first volume appeared in 1715 and the last in 1720. Besides the subscription money, he received from Lintot the publisher £200 for each volume; and his total receipts, according to Dr. Johnson, were £5,820, not reckoning the large sums (including £200 from the king and £100 from the prince of Wales) paid by some of his subscribers in addition to the price. The life of Homer prefixed to the work was written by Parnell, and the information for the notes was gathered principally from Eustathius by Broome, Jortin, and another whose name is not mentioned. Almost simultaneously with the publication of the first volume appeared a translation of the first book of the Iliad by Tickell, to which Addison gave the preference. The result was an open quarrel with Addison, whom Pope afterward satirized in a piece first published in 1723, and again in 1727, and finally, with some changes, incorporated with the "Prologue to the Satires." During the progress of the Iliad Pope often visited London, gamed, drank, had "luxurious lobster nights," grew ashamed of business, railed at poor authors, and frequented the drawing rooms of women of rank and fashion, and the country seats of the nobility, where his charming conversation made him always welcome. Lady Mary Wortley Montagu made a particular impression upon him, and was one of his correspondents. But he soon tired of a life of dissipation, and, the estate at Binfield having been sold, removed with his parents to Chiswick, where he published a collection of his poems (fol. and 4to, 1717), in which first appeared his "Elegy to the Memory of an Unfortunate Lady," and the "Epistle of Eloisa to Abelard." Soon after this, his father having died, he purchased the lease of a villa on the Thames at Twickenham. Near this he persuaded Lady Mary Wortley Montagu to take up her residence on her return to England (October, 1718); but the ardor of his affection soon cooled; they met seldom, finally quarrelled, and the lady to whom he had addressed the most impassioned love verses became the object of his coarsest satires. No satisfactory explanation of their quarrel has ever been given; but it is commonly attributed to a declaration of love by the poet under circumstances which provoked the lady into an immoderate fit of laughter. While her influence was on the decline he was smitten by the charms of another lady, "the mild Erinna, blushing in her bays," with the idea of whom he says he became so mad as to steal her portrait and pass whole days in sitting before it. She is now ascertained to have been Judith Cowper, afterward Mrs. Madan, the aunt of the poet Cowper.—Pope's reputation was now so high that Tonson made him an offer to undertake an edition of Shakespeare. The work was published in 1725 in 6 vols. 4to, and, though abounding in faults of all kinds, had at least the merit of pointing out the way for some future correction of the text. His blunders and shortcomings were exposed by Theobald in a treatise called "Shakespeare Restored," and afterward in a formal edition, for which he was suitably rewarded in the "Dunciad." At the same time Pope had "undertaken" for Lintot a translation of the Odyssey, three volumes of which appeared in 1725, and the remaining two in 1726. Though he professed to have had the assistance of two friends (Broome and Fenton), he concealed the amount of this assistance, his own share comprising only 12 books, or one half the whole work. His net profits from the translation amounted to £2,885. In 1727-'8 he published in conjunction with Swift three volumes of "Miscellanies," in which appeared his "Treatise of Martinus Scriblerus on the Bathos, or the Art of Sinking in Poetry," which gave rise to the "Dunciad." The "Treatise" was intended to form part of a larger prose work entitled "Memoirs of Martinus Scriblerus," in which Pope, Swift, Arbuthnot, Parnell, Lord Oxford, Atterbury, Congreve, Gay, and others undertook to ridicule all the false tastes in learning. The project was abandoned in 1715, when the members of the Scriblerus club were dispersed, but to it we owe both the "Dunciad" and "Gulliver's Travels." The authors attacked in the "Treatise" retaliated in a number of publications, and even threatened Pope with personal violence. Thus provoked he determined to crush the whole host of scribblers, and, guided by the advice of Swift, who contributed largely to the prolegomena and notes, produced in 1728 "The Dunciad." The plan was borrowed from Dryden's "MacFlecknoe," and the hero at first was Theobald, who in a later edition was dethroned to make room for Colley Cibber. The sensation caused by the poem was immense. On the morning of publication the "dunces" besieged the printer's shop in crowds to prevent its sale, and failing in that held weekly clubs to concert hostilities. In 1731 appeared Pope's epistle on "Taste" (afterward entitled "Of False Taste," and finally "Of the Use of Riches"), addressed to Lord Burlington, and in the next year an epistle to Lord Bathurst "On the Use of Riches." These are now known as the fourth and third of the "Moral Essays;" the first, to Lord Cobham, "On the Knowledge and Characters of Men," appeared in 1733, and the second, "To a Lady" (Martha Blount), "On the Characters of Women," in 1735. The four epistles composing the "Essay on Man," a work which he had in mind as early as 1725, were published anonymously in 1732, '3, and '4. The "Moral Essays" and "Essay on Man" were but parts of a great scheme which the author did not live to accomplish. The "Imitations of Horace" were begun while the "Essay on Man" was still in progress, that of the first satire of the second book appearing in 1733. Lord Hervey and Lady Montagu, having been satirized in this poem, the former as "Lord Fanny" and the latter as Sappho, replied jointly in "Verses to the Imitator of Horace," and Hervey alone in a "Letter from a Nobleman at Hampton Court to a Doctor of Divinity." Pope answered them in a "Letter to a Noble Lord," which on second thought he suppressed, and in a poetical "Epistle to Dr. Arbuthnot" (1735), which he calls "a sort of bill of complaint, begun several years before and drawn up by snatches." It now stands as the "Prologue to the Satires."—A volume of Pope's letters to Mr. Henry Cromwell had been printed by Curll as early as 1726. Cromwell had given them to his mistress Mrs. Thomas, who sold them to Curll for ten guineas; and though Pope expressed great displeasure, he made no effort to suppress them. Three years afterward a volume of his correspondence with Wycherley was published, undoubtedly by his own contrivance, though he declared the manuscripts had been surreptitiously obtained. In 1735 appeared a volume entitled "Mr. Pope's Literary Correspondence for thirty years," which was also unauthorized. It was published by Curll, who received the books, already printed, from an unknown correspondent styling himself P. T. Not more than 300 copies were furnished him, all of which were imperfect. Pope soon came forward with a "genuine edition" (1737), professedly in self-defence; but it is significant that many of the letters in this genuine edition correspond with those in Curll's, while they differ essentially from the originals; and the conviction is irresistible that P. T. was Pope himself. That the letters were transformed greatly from their original language, addresses altered, names interpolated or suppressed, parts of different letters combined, whole letters forged, and dates changed, to the confusion of all the poet's biographers, has long been known. The publication of his correspondence with Swift (1741) was probably effected by a similar contrivance. His last important work was "The New Dunciad," which appeared separately in 1742, and was combined with the former satire, as a fourth book, in 1743. It is superior to the other in its object, which was to satirize all false pretenders to taste and science, but it has been objected that the subjects introduced do not harmonize with the previous parts of the work. In the substitution of Cibber for Theobald when the whole was republished in 1743 he made a capital mistake, for the descriptions of the dull and witless editor of Shakespeare became ludicrously inappropriate when applied to the gossiping and vivacious comedian. Pope now resolved to devote his remaining days to preparing with the assistance of Warburton a complete edition of his works. He lived to supervise only the "Dunciad," the "Essay on Man," and the "Essay on Criticism." His disease was dropsy in the breast. He was buried in the parish church of Twickenham, where 17 years afterward Warburton erected a monument to his memory.—Despite his fondness for little intrigues, his petulance, his vanity, and his frequent disregard for truth, Pope was warm and persevering in his friendships, social, generous, and benevolent. His devotion to his mother, who lived with him to the age of 93, was remarkable. He apparently felt little attachment to his religion (Roman Catholic), but he resisted great temptations to change it when such a step would have opened to him the highest worldly advantages. The deformity of his person was redeemed by a fine, thoughtful countenance, and a quick, piercing eye. The minute description of his habits given by Dr. Johnson applies only to the later years of his life, when he was so weak that he could hardly stand erect without the support of corsets, and required the assistance of a maid to dress and undress him. To the last he was a diligent student; he seldom published anything till he had kept it several years by him; and probably no poet ever possessed in a higher degree "the last and greatest art, the art to blot." His letters are admirable specimens of prose composition, full of humor, wit, and vivacity, but too studiously elaborate to be models of epistolary style. Some of them, like many of his other prose writings and poems, are grossly indecent.—The best editions of Pope's works are Warburton's (9 vols. 8vo, 1751–'60), Bowles's (10 vols., 1807), and Roscoe's, with a memoir (10 vols., 1824). A new critical edition, commenced by J. W. Croker and continued by the Rev. Whitwell Elwin, was begun in 1861; the eighth volume, constituting the third volume of the correspondence, and including many letters never before printed, was published in London in 1872. There is an excellent life of Pope by R. Carruthers in Bohn's "Illustrated Library" (1857), and it was also published in 4 vols. 8vo (1858). Among recent editions of his poetical works are those edited by C. Cowden Clarke (2 vols., 1873), and by W. M. Rossetti (1873). A great deal of information concerning Pope has been brought to light within the last few years in the London "Athenæum" and "Notes and Queries."

POPE, John, an American soldier, born at Kaskaskia, Ill., March 12, 1823. He graduated at West Point in 1842, and was made brevet second lieutenant of topographical engineers. In 1842–'4 he served in Florida, in 1845–'6 on the survey of the N. E. boundary line, and in 1846-'8 in the war with Mexico, being brevetted as first lieutenant and captain for gallant and meritorious conduct at Monterey and Buena Vista. In 1849–'50 he was employed in topographical surveys and explorations in Minnesota; in 1851–'3 as chief topographical engineer in the department of New Mexico; in 1853–'9 in charge of the survey of the Pacific railroad route near the 32d parallel of latitude, and in experiments to procure water on the Llano Estacado by means of artesian wells; and in 1856 was made captain of topographical engineers for 14 years' continuous services. In 1859–'60 he was employed on lighthouse duty. After the outbreak of the civil war he served for a few months as mustering officer at Chicago. He was made brigadier general of volunteers, May 17, 1861, and placed in command of the district of North Missouri, and subsequently in other portions of the state. He was in command of the army of the Mississippi in the movements which terminated in the occupation of New Madrid, March 14, 1862, and in the capture of Island No. 10, April 8, having been made major general of volunteers, March 21. In June he was called to the east, and placed in command of what was for a few months styled the army of Virginia, comprising all the troops in that state except the army of the Potomac, under McClellan. The forces under his command fought the battles of Cedar Mountain, Aug. 9, and Bristoe Station, Aug. 27; the second battle of Bull Run, or the battle of Groveton, Aug. 29–30 (see BULL RUN); and the skirmish at Chantilly, Sept. 1. He was made brigadier general in the regular army, July 14, 1862. Early in September, at his own request, he was relieved from the command of the army of Virginia, which soon became virtually a part of the army of the Potomac, and returned to the command of the department of the Northwest, which he held till January, 1865. He was made brevet major general in the regular army in March, 1865. From January to June, 1865, he was in command of the military division of the Missouri. He was mustered out of the volunteer service in September, 1866, and is now (1875) commander of the department of the Missouri, with his headquarters at Fort Leavenworth. He has published "Explorations from the Red River to the Rio Grande," in the "Pacific Railroad Reports," vol. iii., and an account of "The Campaign in Virginia of July and August, 1862" (1863).

POPISH PLOT. See OATES, TITUS.

POPLAR (Fr. *peuplier*, from Lat. *populus*), the common name for trees of the genus *populus*, the classical Latin name, said to have been given because it was much planted in public walks and was regarded as the tree of the people. The willow family (*salicaceæ*) contains but two genera. *salix*, the willow, and the poplar; both diœcious trees, bearing their flowers in dense, cylindrical catkins, one under each scale or bract; the male flower consists of two to several stamens; the female of a one-celled ovary with numerous ovules, which ripens into a two-valved pod containing numerous seeds, furnished with long silky down. The poplars differ from the willows in having mostly angular branches, much broader and more or less heart-shaped leaves, and especially in the catkins, the scales of which in the willow are entire, but in the poplar are cut-lobed or fringed at the apex; the poplar has more numerous stamens, the stamens and the ovary in a small oblique cup or involucre; the scaly buds of the poplars are usually covered with a resinous varnish. They are natives of temperate countries, and of very rapid growth; their wood is soft, and of little use where strength is required, though very durable if protected from the weather; as a fuel the wood is exceedingly poor. From their rapid growth and the ease with which they take root from cuttings, poplars of various kinds have been recommended for planting by settlers upon the prairies; but there are other trees which grow about as quickly, and produce wood in every respect more valuable. When the capsules are ripe they break open and set free the seeds, which by means of their downy tufts are scattered in multitudes in every direction; this down is not only exceedingly annoying to housekeepers, as it penetrates everywhere, but the particles floating in the air are breathed and cause much irritation of the air passages; if planted for shade, cuttings of the male trees should be selected to avoid the discomforts attendant upon the dispersion of the seeds. The leaves in most species are stirred by the slightest breath of wind, and may be seen in tremulous motion when the foliage of other trees is scarcely stirred; this motion is said to be due to the fact that the petioles are compressed laterally; in most leaves the flat surface of the petiole is parallel with the plane of the leaf blade, but in poplars it is at right angles to it. The resinous material covering the unopened buds, more abundant in some species than others, is very useful to bees, as it furnishes them with a large share if not all of the *propolis* or cement with which on taking possession of a new hive they not only seal up every crack and crevice, but coat the whole interior surface. The species all contain a bitter principle, and the bark and leaves of several have been used as a tonic and an antiperiodic; they contain, besides salicine, an analogous principle, populine. The bark of some is used to dye a yellow.—The most widely distributed and best known of our species is the cottonwood, *populus monilifera*, the necklace-bearing poplar, which is such a characteristic

Cottonwood (Populus monilifera).

tree of the far west, that many suppose it to be a peculiarly western species; it is found in New England, and extends quite across the continent, being very abundant in the valley of the Mississippi, and on the otherwise treeless plains beyond is found marking the courses of rivers and small streams. It derives its specific name from the fruiting aments, which are very long, and with the unopened capsules upon them have some resemblance to a string of beads. The tree grows 80 ft. or more high; the wood is very difficult to split, the fibres being so interlaced, and though of very poor quality, it is made, in localities where this is the only large wood procurable, to serve a variety of purposes. It is called cottonwood from the great abundance of down upon the seeds, and in planting it for shade special care should be taken to set cuttings from the staminate tree only. The narrow-leaved cottonwood, *P. angustifolia*, is a far western tree, found growing with the common cottonwood, and by some considered as a variety, as it resembles it in everything except its leaves, which are ovate-lanceolate, sometimes acute, and slightly serrate. The angled cottonwood, *P. angulata*, has more angular branches and larger leaves than the true cottonwood, and is supposed to be a mere variety of it; another form, known in the western states as yellow cottonwood, can only be distinguished by the color of its heart wood, which is yellowish; it splits more freely, warps much less, and is more durable than the ordinary cottonwood.—The American aspen, *P. tremuloides*, so named from its general resemblance to the European *P. tremula*, is a graceful tree 20 to 50 ft. high and quite common in woods, especially northward and in Canada; it shows in a marked degree the tremulous motion of the leaves, which are round-heart-shaped, with small regular teeth; the trunk has a smooth greenish white bark. This is regarded as a short-lived tree of no special use. The large-toothed aspen, *P. grandidentata*, receives its name from the large, irregular, wavy teeth to its leaves, which are larger than in the one preceding, and, though smooth when full grown, are at first very downy on both sides; it is also a larger tree with a gray bark. Its timber, which has considerable strength, is durable if kept dry, and is employed for interior work; in states where it is abundant it is used for fences, being cut of the proper length, split, and nailed to posts; if felled in summer and peeled, it makes a durable fence stuff, but if left with the bark on it speedily decays. A weeping variety is known in the nurseries as *P. grandidentata pendula;* it has its branches as distinctly pendulous as those of the weeping willow, and when grafted upon a stock of Lombardy poplar, some 10 or 12 ft. high, it grows rapidly and makes one of the most beautiful of lawn trees. The downy poplar, *P. heterophylla*, has its leaves covered with white wool when young; it is a large tree of no special interest, found in swampy lands from New England to Illinois. The balsam poplar, *P. balsamifera*, is a large tree, also called tackmahack, found from New England to Wisconsin and northward; it has ovate, tapering, and pointed leaves, and the large leaf buds are covered with abundant varnish; the tree is of no special use. Its variety called balm of Gilead (*P. balsamifera*, var. *candicans*) differs from the species in having broader and more or less heart-shaped leaves, with somewhat hairy petioles; it has a similar range with the preceding; it is rare in the wild state, but not uncommon in cultivation. Some 30 years ago it was a popular tree to plant for shade, and for the pleasant fragrance given off by its buds in spring; it suckers badly, and is much infested by insects. A tincture, made by putting the buds into spirit, was formerly a popular remedy for chronic rheumatism and pulmonary complaints; the resin of the buds is apparently a stimulant, similar to the turpentines and balsams.—Among the European species the most common in cultivation is the white poplar, *P. alba*, which is quite as frequently called abele, a name introduced with the tree from Holland into England; the Dutch name *abeel* is said to be from the Latin *albellus*, whitish, a name given to the tree by some ancient writers. All these names refer to the marked character of the tree, the persistent white color of the under sides of the leaves; the white cottony down does not as in most species disappear with age, but as the leaves grow older the contrast between the dark green of the upper and almost snowy whiteness of the lower surface becomes stronger. The tree is a rapid grower; it has an ash-gray bark and a somewhat regular dense head; it was at one time very popular, but its defects having been discovered, it is now as much decried as it was formerly praised; in its appropriate place it is a most valuable tree, but that is not upon a lawn or in cultivated grounds, as it throws up suckers in great num-

White Poplar or Abele (Populus alba).

bers; in paved streets, where suckers cannot grow, it is a desirable tree, as it thrives well in spite of dust and smoke; its suckering propensity makes it useful for planting near the seashore, to restrain the blowing sands. A variety of this (var. *canescens*), known as the gray poplar, has smaller leaves and not so white underneath; the wood is regarded as the most valuable of any European poplar, and is used for floors and other inside work, and for making various small articles; as a fuel it is about equal to pine. The black poplar, *P. nigra*, grows wild in southern Europe and temperate Asia, to the height of 50 to 80 ft., with an ample head and numerous branches. The bark is ash-colored, and becomes deeply furrowed with age; the leaves, slightly notched upon their edges, are pale green, the petioles yellowish. The wood is soft, yellow, and fibrous, and is employed in making packing cases, and as it never splinters it is very useful for turning into bowls, trays, and such wares; it is an indifferent fuel. The bark is used in Russia in preparing morocco leather; the resin of the leaf buds is esteemed for healing properties. The Lombardy poplar, called *P. dilatata* and *P. fastigiata*, is believed to be a variety of the black poplar; it is well known for the upward tendency of its branches, and for its spire-like outline. About half a century ago there was a mania for planting this tree in avenues, than which nothing could be more formal or in worse taste; fortunately the abundant insect enemies of the tree have caused most of these sombre avenues to disappear, but a single tree is still occasionally seen. In landscape gardening, where it is desirable to give variety to the outline of a group, a specimen of this may be be introduced with good effect. The trembling poplar or European aspen, *P. tremula*, is a rapidly growing tree of middle size, with a clear, straight trunk, and smooth bark, becoming gray and cracking with age; the branches, which are few, become pendulous; the young shoots are tough, pliant, and of a reddish color; the flowers appear early; leaves roundish ovate or nearly orbicular and toothed, at first downy, but at length smooth on both sides. The wood is tender and white, and employed by turners, engravers, cabinet makers, &c., and also used for burning into charcoal; its bark is employed for tanning; the leaves, either green or dry, are eaten readily by cattle and sheep. The tremulous character of the aspen (the older name of the tree is *aspe*, from A. S. *æpse* and *æsp*) is recognized by many poets, and to "tremble like an aspen" has passed into a proverb. The tree is but little known in this country, it having no superiority to our native aspen.

POPOCATEPETL (Aztec, "the smoking mountain"), a volcano about 45 m. S. S. E. of the city of Mexico, in lat. 19° N., lon. 98° 30′ W., the largest of the six craters which succeed each other across the republic on the same parallel. It is an irregular cone of porphyritic obsidian, with an elevation, according to the latest measurements, of 17,540 ft. above the sea, or about 1,800 ft. higher than Mont Blanc. To the height of nearly 13,000 ft. it is covered with dense forests, those in the upper regions being almost exclusively of pine: for the last 3,000 ft. the sides lie beneath alternate layers of pumice and ashes, shrouded in eternal snow. The crater is about 3 m. in circumference, and has a depth of over 1,000 ft. Large quantities of sulphur are extracted from it, for which purpose several persons permanently reside within it, ascending and descending a large part of the way by ropes. The mountain is connected with Iztaccihuatl by a ridge, which at the pass of Ahualco is about 10,000 ft. above the sea. In 1519 Popocatepetl was in a state of extraordinary activity, and Cortes sent ten men under the leadership of Diego de Ordaz to climb to its summit. In 1522 Francisco Montaño reached the top, and was let down by ropes into the crater to a depth of about 450 ft. In 1827 the brothers Frederick and William Glennie ascended to the highest point, and calculated the elevation of the volcano barometrically. More accurate calculations have since been made, particularly the last, by Sr. M. Ponce de Leon, in 1870.

PÖPPIG, Eduard, a German naturalist, born in Plauen, Saxony, July 16, 1798, died at Wahren, near Leipsic, Sept. 4, 1868. He was educated in Leipsic and Grimma, and devoted himself from the first to the study of natural sciences. In early life he made scientific explorations in Cuba, the United States, and South America. He was the first to ascend (1829) the volcanic mountain Antuco in Chili, and spent several years among the aborigines in the province of Maynas, who escorted him when he descended the Amazon on his journey to Pará. He was professor of zoölogy in the university of Leipsic from 1833 till his death, and founded there the celebrated zoölogical museum. His principal works are: *Reise in Chile, Peru und auf dem Amazonenstrom* (2 vols., Leipsic, 1835), and *Nova Genera ac Species Plantarum* (3 vols., 1835–'45, the first volume with contributions by Endlicher).

POPPY (Ang. Sax. *papig*), the common name of plants of the genus *papaver*, the type of the order *papaveraceæ*, or poppy family. Some botanists have united the fumitory family (*fumariaceæ*), which have very irregular flowers, with the poppy family, for which there seems to be no necessity. As formerly restricted, the poppy family consists of herbs (rarely somewhat woody) with a milky or colored juice; with alternate or radical, mostly divided leaves, without stipules; regular flowers, with two, rarely three sepals, which fall as the flower expands, and twice or multiple the number of petals; stamens numerous, distinct; ovary one-celled, with parietal placentæ, and forming a capsular fruit opening by pores or valves; seeds albuminous with a small embryo. The larger part of the family belongs

Common Poppy (Papaver somniferum).

to the south of Europe and adjacent parts of Asia, and there is another centre in California and the neighboring states, where a similar climate is found. The genus *papaver* is distinguished from the rest of the family mainly by having its globular or oblong ovary and fruit crowned by a sessile circular disk, upon which the stigmas radiate from the centre; within there are as many incomplete cells, formed by the projection of the placentæ into the cavity, as there are stigmas, and the fruit when ripe opens by as many pores, just under the disk, to liberate the seeds; the petals are crumpled within the flower bud. There are 14 species of poppy, one in southern Africa, one in Australia, and the others in the temperate and subtropical parts of Europe, Asia, and northern Africa; but one species is native in the United States, and, what is rather remarkable, while other weeds of agriculture have become perfectly naturalized, the three or four species of poppy so common in the grain fields and other cultivated grounds in Europe are exceedingly rare in this country, and though they have been introduced they occur in restricted localities, showing no disposition to spread. The opium or common poppy (*P. somniferum*), besides being the species which affords the valuable drug (see Opium), is also the original of most of the garden poppies. It is a native of southern Europe, and both here and in England is to be found partially naturalized in waste places, having escaped from gardens. It is smooth and glaucous, with its toothed or lobed leaves clasping the stem at base; in its single state it has but four petals, which are white or purple; the garden forms are often very double and of various colors, such as white, rose, lilac, violet, and sometimes striped with these, and frequently with the petals beautifully fringed; this, and all other annuals of the family, should be sown where they are to flower, and after they are well up be thinned to six inches apart, as it is almost impossible to transplant them successfully. The single poppy is much cultivated in Europe for the capsules, which are an article of commerce under the name of poppy heads, and for the seeds; the capsules vary greatly in size and form, in some soils being three inches in diameter, which is twice the usual size; some are globose, others depressed and much broader than long, and they are sometimes met with greatly elongated. Poppy capsules are much used abroad for making a fomentation for painful affections, and for the sirup of poppies. The capsules owe whatever efficacy they may have to the morphia they may contain, and this is very variable, depending upon the locality where they are grown and the time of gathering; while some chemists have found in them 2 per cent. of morphia, others have failed to detect any whatever. The sirup of poppies, sometimes used in medicine for children, is a preparation which has no advantages over a sirup of morphia of corresponding strength, and the great disadvantage of containing varying quantities of the opium alkaloids; it is moreover apt to spoil; in fact, the preparations known by this name are likely to be made, not from poppy heads, but from opium or morphia. The seeds, usually white, but sometimes black, are very numerous, and show under a magnifier a handsomely reticulated surface; they have a pleasant nut-like flavor, and, being without any of the narcotic properties of the plant, are used as food in various countries. In opium-producing countries the seeds, which appear to ripen perfectly in the capsules which have been scarified for opium, are an important part of the crop; they yield about a third of their weight of a bland, well flavored oil, which, though a drying oil, may be used when fresh as olive oil; the cake left after expression is a valuable food for domestic animals.—The field poppy, *P. rhœas*, known to the ancients as *rhœas*, is the common corn poppy or corn rose, found in the greatest abundance in the grain fields throughout Europe, but is probably truly indigenous only in the southernmost parts of that continent. It has an erect stem, 1 or 2 ft. high, with stiff spreading hairs; the flowers are large, of a rich scarlet color, with a dark violet eye in the centre; the small smooth capsule is globular. The petals of this species are used in European pharmacy for their coloring matter solely, as they have no narcotic property. Semi-double and double varieties of this species, though their odor is unpleasant, are cultivated in gardens as French poppies and African rose, where they make a most brilliant show. The long-headed poppy, *P. dubium*, is scarcely to be distinguished from the preceding; it has more cut leaves and rather smaller flowers, but the chief difference is in the capsule, which is smooth and often twice as long as broad. This weed of European agriculture is sparingly naturalized in Pennsyl-

Smooth-fruited Corn Poppy (Papaver dubium).

vania, as is another species, the pale poppy (*P. argemone*), which has very pale red flowers and an oblong, hairy capsule.—Of the perennial species, the alpine poppy, *P. alpinum* (sometimes *P. nudicaule*), a native of the northern parts of Europe, the Rocky mountains, and arctic America, is only to be found in cultivation in choice collections; it forms dense tufts of radical leaves, and throws up flower stems a foot high with large orange, yellow, or white flowers. The oriental or perennial poppy, *P. orientale*, is not only the showiest of all poppies, but one of the most splendid of all hardy plants; it is a native of the Caucasus; has ample leaves about a foot long and rough with white hairs; its hairy stems, 2 to 3 ft. high, bear each a solitary flower, 6 in. or more across, of the deepest scarlet, and usually with a blackish purple spot in the centre; a variety is called *P. bracteatum*, on account of some leafy bracts below the flowers, but this is not constant; indeed, a lot of seedlings will present considerable variety in this respect as well as in the shape of the buds and size of the flowers. Planted where the flowers can be seen from a distance against a background of dark green foliage, this poppy makes a brilliant show. It may be propagated by seed, in which case it does not usually bloom until the third year, or by division of the roots, which should always be done as soon as the foliage dies down in August.—The horn poppy of Europe, *glaucium luteum*, is sparingly introduced, from New England to Virginia, near the coast; it has very glaucous, thick, hairy leaves, solitary yellow flowers, and a very narrow linear pod 6 to 10 in. long. The prickly poppy is *argemone Mexicana*, a native of tropical America, sometimes cultivated in gardens, and abundantly naturalized in the southern states as a weed. It is an erect, very prickly plant, with its much lobed, prickly toothed leaves often blotched with white, and bears large yellow, sometimes white flowers, followed by very prickly capsules, which open at the top by valves. It is a rather showy plant, and sometimes seen in cultivation. The California poppy is *Eschscholtzia*, a genus named in honor of Eschscholtz, a botanist who visited California early in this century. There are four or five species, all smooth annuals, with pale finely divided leaves and slender flower stalks, each bearing a large orange or yellow flower; this genus is distinguished by the union of its sepals to form a long pointed cap, shaped like an extinguisher, which falls off entire as the flower opens, and in most species the receptacle or top of the flower stalk is dilated to form a rim on which the cap rests. These are popular garden annuals, *E. Californica* being the most common, but the species are much confused, and the seedsmen have given specific names to mere garden forms; the flowers range from white through salmon and the brightest yellow to orange; they are most effective in masses, and a bed of them is very brilliant. So abundant are these plants in California that large patches of them on the hills near the coast may, when the sun is favorable, be seen from a considerable distance at sea. The tree poppy of California, *dendromecon rigidum*, is remarkable as being a shrubby member of the family; it grows 3 to 5 ft. high and has large yellow flowers. The bear poppy, *arctomecon Californicum*, was described by Torrey from poor specimens brought home by Fremont in 1844, and has been regarded as a doubtful genus; but in 1874, 30 years later, it was rediscovered by Dr. C. C. Parry, and proves to be quite distinct.

PORBUS, Frans, the younger, a Flemish painter, born in Antwerp in 1570, died in Paris in 1622. He was a grandson of the painter and geographer Pieter Porbus, and a son of Frans Porbus the elder. He early settled in Paris. His most celebrated works are "The Last Supper," in the Louvre, and his portraits of the royal family. Portraits of Henry IV. and Maria de' Medici, attributed to him, were bequeathed to the Louvre in 1875.

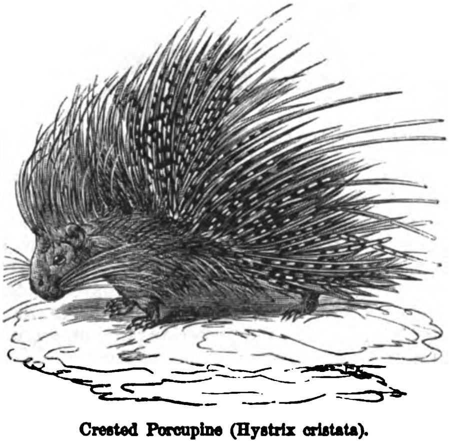
PORCELAIN. See POTTERY AND PORCELAIN.

PORCUPINE (Lat. *porcus*, a hog, and *spina*, a thorn or spine), the common name of the subfamilies *cercolabina* and *hystricina*, the most highly organized and widely distributed of the rodent family of *hystricidæ*. The former is confined to America, and the latter is spread over the old world. In both subfamilies the clavicles are nearly perfect, attached to the sternum but not to the scapula; the infraorbital foramina are very large; the frontals very broad; the malar bones destitute of an angular process on the lower margin; the molars $\frac{4-4}{4-4}$; the dorsal vertebræ usually 14, and the lumbar 4; feet short; body more or less armed with spines or quills, capable of erection by the subcutaneous muscles.—The *cercolabina* live almost entirely in trees, and their feet have generally only four nearly equal toes, with long, compressed, and curved claws; there are sometimes five toes on the hind feet; the soles are thickly studded with small flattened warts; the skull short and broad, with a minute lachrymal bone forming no part of the lachrymal canal; the palate between the molars is on a lower level than the anterior portion; the molars converge in front, and are distinctly rooted, each having a fold of enamel on either side, the worn crown presenting two deep transverse cavities surrounded by enamel; incisors small; anterior and posterior clinoid processes wanting. This subfamily contains the genera *erethizon* (F. Cuv.), *cercolabes* (Brandt), and *chætomys* (Gray). The genus *erethizon* has a non-prehensile tail, short, thick, flattened, covered at the base above with hairs and spines, and on the under side and at the apex with stiff bristles; nostrils close together; feet short and broad; toes four or five, with long curved claws; hind feet with a distinct inner toe with claw, without any projecting semicircular lobe on the inner side; upper lip slightly notched, but with no naked mesial line; body stout and covered with a long and dense fur from which the spines project; limbs short and strong. The best known species is the Canada porcupine (*E. dorsatus*, F. Cuv.), about 2½ ft. long, weighing from 20 to 30 lbs.; it appears larger than it really is, from the length of the hair and spines; the fur is generally dark brown, soft, woolly, and grayish next the skin, coarse and bristly in some parts, 6 or 7 in. long on the back, the coarse hairs usually with dirty white points, giving to the whole a hoary tint; the spines, more or less hidden by the fur, and abundant on the upper surface of the head, body, and tail, are 2 or 3 in. long, white with dark points; the tail is about 10 in. additional to the above length; the incisors deep orange. It is very clumsy, with back much arched, snout thick and tumid, ears short and round, and tongue rough with scales. It is found between northern Pennsylvania and lat. 67° N., and to the east of the upper Missouri river. It is an excellent though a slow climber; it is not able to escape its enemies by flight, but cannot be attacked even by the largest carnivora with impunity; dogs, wolves, the lynx, and the cougar have been known to die from the inflammation produced by its quills; these are loosely attached to the skin and barbed at the point, so that they easily penetrate, retain their hold, and tend continually to become more deeply inserted; when irritated it erects its quills, and by a quick lateral movement of the tail strikes its enemy, leaving the nose, mouth, and tongue beset with its darts; it has no power of shooting the quills. The food consists of vegetable substances, especially the inner bark and tender twigs of the elm, basswood, and hemlock; it seldom quits a tree while the bark is uneaten, except in cold weather, when it descends to sleep in a hollow stump or cave; as it kills the trees which it ascends, its depredations are often serious. It is often erroneously called hedgehog in New England.. The nest is made in a hollow tree, and the young, generally two, are born in April or May. It is almost as large as a beaver, and is eagerly hunted by the Indians, who eat the flesh, and use the quills for ornament, often dyeing them with bright colors; it is very tenacious of life; it does not hibernate, as the European porcupine is said to do. This animal shows admirably that the quills are only modified hairs, as it presents quills on the back, spiny hairs on the sides, and coarse bristly hairs on the under surface, passing into each other in regular gradation. The yellow-haired porcupine (*E. epixanthus*, Brandt) is smaller than the preceding, blackish brown, the long hairs of the body tipped with greenish yellow; it is found W. of the Missouri to the Pacific ocean.—In the genus *cercolabes*, which includes the tree porcupines, the body is similarly armed with spines and spiny hairs; the tail is long and prehensile; all the feet four-toed, with long and curved nails, the hind feet having each a rudimentary inner one, a small nailless tubercle, and being with the palm much expanded by a semicircular lobe on the inner side; the soles are rough and naked, the claws long, and the hind feet so articulated that the soles are directed inward; the lobe can be bent inward, being supported by several bones, some supernumerary; the tail is thick and muscular at the base, slender and bare above and prehensile at the end, the upper surface being applied to the branches, and the tail coiled in a direction opposite to that of the monkeys of the same country. The muzzle is very movable, hairy, thick, and obliquely truncated; the eyes small but prominent; ears small and sparingly clothed with hair; the incisors are narrow. They emit a disagreeable odor, somewhat like that of garlic; the food consists of fruits, leaves, and tender bark; they are usu-

Canada Porcupine (Erethizon dorsatus).

ally seen singly, and sleep during the heat of the day, feeding at morning and evening; they are harmless, easily reconciled to captivity, but with very little intelligence. They inhabit America, from Mexico to Paraguay, living on trees, on which they are expert but slow climbers. The Brazilian tree porcupine (*C. prehensilis*, Brandt) is 16 to 20 in. to the base of tail, the latter nearly as much more. It is abundant in Guiana, Brazil, and Bolivia, and feeds on the fruit of the palms. In the Mexican tree porcupine (*C. Novæ Hispaniæ*, Briss.) the general color is black; the spines are nearly all hidden by the fur, yellowish or whitish with black points; it is about 18 in. long, with a tail of 14 in.; it inhabits the temperate mountain regions of eastern Mexico, between 2,000 and 4,000 ft. above the sea. Other species are described in vol. ii. of Waterhouse's "Natural History of the Mammalia" (London, 1848). Dr. Lund describes from the caves of Minas Geraes in Brazil two species of fossil tree porcupines, one of which he believes to have been as large as the peccary.—The subfamily *hystricina*, or the old world porcupines, dwell on the ground, living in burrows or caves in the rocks; they have five toes on each foot, and the soles are naked and smooth; the skull is elongated, with a distinct lachrymal bone partly enclosing the lachrymal opening; molars semi-rooted and in parallel series, those of the upper jaw with one internal fold of enamel and three or four externally, soon assuming the form of small isolated areas; lower molars with the folds reversed; the whole palate is on the same level and the clinoid processes are distinct; the upper lip is divided by a vertical groove. They are found in S. Europe, middle and S. Asia, and Africa. In the genus *hystrix* (Linn.) the tail is short, and the hinder part of the neck is armed with long cylindrical spines or quills; the inner toe of the fore feet is very short, with a small blunt nail; there are five fleshy pads on the fore, and six on the hind soles. The crested or common porcupine (*H. cristata*, Linn.) is found in S. Europe, where it has come from N. and W. Africa; it is about 28 in. long, the tail about 8 in. more; the muzzle is large and obtuse, sparingly clothed with small dusky hairs, with scattered longer and coarser ones on the upper lip; anterior and under parts and limbs with spines not more than 2 in. long, with which are mixed some coarse hairs; crest of numerous very long bristles, extending from the crown to the back, 16 in. long, and curving backward; hind parts of the body and tail covered with quills, some slender and flexible, 12 to 16 in. long, others shorter, stouter, and very sharp; a few on the tip of the tail are hollow, generally open and truncated at the end, and supported on a very slender stalk about half an inch long. The prevailing color is brownish black, with a white band on the fore part of the neck; the longest quills have the terminal fifth white, and the rest variously ringed black and white; bristles of crest dusky with long white points, some all dirty white; feet black; the quills vary considerably in color, but are generally grooved with several delicate longitudinal channels. The skull may be at once recognized by the great size of the nasal bones, the development of the nasal cavity, and the highly arched upper surface. This is the *porc-épic* of the French, the spiny pig, so called from its heavy pig-like look and its grunting voice. It lives in rocky crevices or in burrows, becoming torpid in winter; the food consists of various vegetable substances, and its flesh is well flavored; it can erect its quills at pleasure, but cannot discharge them; besides its grunts, it makes a rattling noise by shaking the tuft of hollow quills on the tail; it also strikes the ground with its feet like the hares. Fossil bones of this genus have been found in Italy and India.

Brazilian Tree Porcupine (Cercolabes prehensilis).



Crested Porcupine (Hystrix cristata).

PORCUPINE ANT-EATER, the popular name of the *echidna* (Cuv.), a genus of marsupial mammals of the section *monotremata*, inhabiting

Australia and Tasmania. The snout is long, slender, and naked, and the tongue protractile, very long, and slender, as in the ant-eaters proper; the opening of the mouth small; the upper part of the body covered with spines and hairs intermixed; legs short and powerful; all the feet with five well developed toes with large nails, the fore feet formed for burrowing, and the hind feet in the male with a horny spur as in the ornithorhynchus; tail very short, and hidden by the spines. The best known species, the *E. aculeata* (Shaw), is about a foot long, with a stout body, spiny above, and the head, limbs, and lower parts with brownish black coarse hair; inner toe of the hind feet with a broad rounded nail, the others with long curved claws, that of the second very long. It is considerably larger than the common hedgehog, is powerfully built, and especially adapted for burrowing. The food consists of ants and other small insects, which it captures like the ant-eaters with its tongue, by means of a viscid matter secreted by two large submaxillary glands extending from behind the ear to the fore part of the chest; there are no teeth in the jaws, but the palate is armed with several rows of horny spines directed backward, and the upper surface of the tongue is furnished with numerous small corneous warts. The skull in shape has been compared to the half of a pear cut lengthwise, being 4 in. long by 1¾ in. wide at the posterior portion, ending in a point anteriorly; nostrils near the end of snout; eyes small and black; ear cavity in the form of a long tube, with its S-shaped opening on the back of the head. The spines are dirty white tipped with black, sharp, about 1¾ in. long, directed backward, and on the back inward, crossing each other on the mesial line. The hind feet in the natural position rest on their inner side, the concave surface looking outward, thus keeping the claws unworn for casting aside the earth loosened by the fore claws. In captivity it is stupid, slow-moving, avoiding the light, and active only in burrowing, which it does with astonishing rapidity; specimens have been kept alive at the London zoölogical gardens, where they were fed on bread and milk; when irritated or asleep they roll themselves in a ball, the head between the fore legs. It can sink into loose sand directly downward, presenting only its spiny back to its enemies; in spite of its defensive armor, it often falls a prey to the thylacine and other carnivorous marsupials. Its common name is inappropriate, as it is neither a rodent like the porcupine nor an edentate proper like the ant-eater, though it has the spiny covering of the one and the toothless jaws of the other; in some districts it is called the hedgehog, which is equally inapplicable, as the dentition of the insectivora is not represented in this animal; perhaps, however, the name here given, originally imposed by Shaw, is the best that could be selected. It is now very rare.

Porcupine Ant-Eater (Echidna aculeata).

PORGY. See Scuppaug.

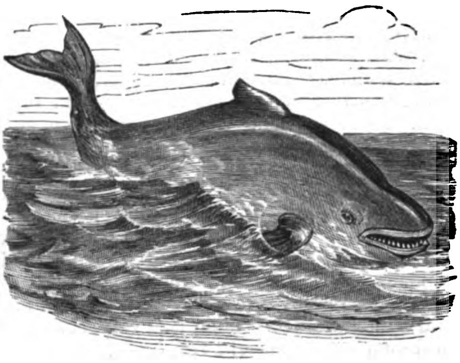
PORISMS (Gr. *πορίσμα*, from *πορίζειν*, to supply or deduce), a class of geometric propositions treated by the ancient Greek geometers, the precise nature of which is a matter of dispute. The only original authorities we have upon the subject are the seventh book of the "Mathematical Collections" of Pappus and the commentary on Euclid's "Elements" by Proclus. In both authors the language is so vague and the text so corrupt that they have served rather to stimulate the curiosity and exercise the ingenuity of scholars than to afford any real insight into the subject. Euclid is said to have written three books of porisms, but our information in regard to them is substantially confined to the imperfect account of Pappus above mentioned. According to this, a porism is a proposition intermediate between a theorem and a problem. "A theorem," says Pappus, "is a proposition requiring demonstration, a problem one requiring construction, a porism one requiring investigation." This is too vague to afford much assistance in the restoration of this class of propositions. The first important step in this direction was made by Robert Simson in a work published in 1776, after his death. His definition was substantially the same as that afterward given by Playfair in a paper contained in the "Transactions of the Royal Society of Edinburgh," vol. i., which we quote: "A porism is a proposition affirming the possibility of finding such conditions as will render a certain problem indeterminate or capable of innumerable solutions." The most important recent work on the subject is by M. Chasles, *Les trois livres de porismes d'Euclide rétablis* (Paris, 1860). According to him, "a porism is an incomplete theorem expressing certain relations between things varying according to a common law indicated in the enunciation. The theorem would be complete if the magnitude and position of certain things which result from the hypothesis were determined, but which the enunciation of the porism does not explain." Other views have been presented by mathematicians of great ability, and the subject must still be considered as involved in obscurity.

POROSITY (Gr. πόρος, a passage), the condition of open structure in which the particles of matter are arranged in all bodies, leaving between them pores or interstices that are supposed to be vacant or filled with air. The existence of such spaces even in the most solid bodies is proved in various ways. When wood or stone of the most compact structure is immersed in water under the receiver of an air pump and the air is exhausted from the surface, that contained in these bodies immediately makes its appearance rising in a cloud of bubbles. Under great pressure water is forced through the pores of cast iron, even of 4 in. thickness. The porosity of this material is evidently increased by dissolving out the carbon disseminated throughout its substance, by which it becomes malleable iron without change of form, but the change of texture thus indicated is not apparent to the eye. Density, which is the opposite condition to porosity, is increased in most metals by pressure and hammering. Liquids are also supposed to be porous from the fact that mixtures are sometimes made which occupy less space than the sum of the volumes of the ingredients when separated. This is the case with alcohol and water. (See Compressibility.)

PORPHYRY (Gr. πορφύρα, purple), a rock so named from the prevalent color of the varieties used by the ancients, as the *rosso antico* or red porphyry of Egypt. This variety consists of a ground or paste of reddish feldspar in which are disseminated rose-colored crystals of the feldspar called oligoclase, with some plates of blackish hornblende and grains of peroxide of iron. This in general is the character of porphyry; but the paste may be green, red, purple, or black, and the interspersed crystals may present various shades, usually lighter than the ground. They may be also of hornblende, quartz, augite, olivine, and other minerals. The rock is very hard. On the smooth surface the crystals appear as blotches. Various rocks of an earthy or compact base with distinct interspersed crystals are termed porphyritic. Granite is so called when it presents distinct feldspar crystals, and so are greenstone, trachyte, &c. The principal uses of porphyry are in architecture and ornamental articles, and in slabs and mullers for grinding hard powdered substances to extreme fineness. No material is more durable, and none retains better the sharp lines and high polish which it receives. In modern times it is most successfully worked by the Swedes and Russians. In the Swedish royal porphyry works of Dalecarlia vases, tazze, &c., of immense size are made, one of the latter exceeding 11 ft. in diameter. A vase of pink granitoid porphyry 6 ft. high and 4 ft. 4 in. in diameter was sent to the great exhibition in London in 1851. In the United States porphyry is met with in granitic regions.

PORPHYRY (Gr. Πορφύριος, *i. e.*, a wearer of purple), a philosopher of the Neo-Platonic school, born in Batanea or in Tyre about A. D. 233, died in Rome about 305. He was of distinguished family, and was originally named Malchus, the Greek form of the Syro-Phœnician Melech, signifying king; but he received from his preceptor Longinus, in allusion to the meaning of that word, the name by which he has ever since been known. He studied under Origen at Cæsarea, under Apollonius and Longinus at Athens, and at Rome under Plotinus, with whom he remained six years, at the end of which period he went to Sicily, where he wrote his treatise against the Christian religion. He subsequently returned to Rome, and taught there for many years. The philosophical doctrines of Porphyry were essentially those of Plotinus, which he regards as identical with those of Plato, and substantially also with those of Aristotle. His doctrine is distinguished from that of Plotinus by its more practical and religious character. The worship of the national gods of a people seems to have been upheld by him, on the ground that respect should be shown to the ancient religious usages of a nation; but he acknowledged one absolute supreme Deity. He wrote expositions of Plato's "Timæus" and "Sophistes" and of Aristotle's *Categoriæ* and *De Interpretatione*, and a still extant isagogical work on Aristotle, which is usually printed at the beginning of the *Organon*. Of his 56 different works mentioned, only 19 are extant. The most celebrated of his lost works is that "Against the Christians," which was publicly destroyed in 435 by order of the emperor Theodosius II. It was in 15 books, and treated both the Jewish and Christian Scriptures very minutely. In it he denied the doctrine of the divinity of Christ, and maintained that the prophecies of Daniel were written after the events. His *Vita Plotini*, composed shortly before his death, appeared first in the Basel edition of the Enneads (1580). The most recent commentators on Porphyry's life and works are Brandis, Wolff, Bernays, Schäfer, and Baltzer.

PORPOISE, the common name of the small cetacean mammals of the genus *phocæna* (Cuv.). The snout is short, uniformly rounded, wide from the breadth of the more horizontal intermaxillaries and maxillaries, without the prolonged beak, separated from the forehead by a distinct furrow, which characterizes the dolphin, to which family it also belongs. The name is evidently a corruption of the French *porc-poisson* (hog fish); it is called *Meerschwein* by the Germans, *marsouin* by the French, and sea hog and puffing pig by the English and Americans. Though it is an air-breathing mammal and not a fish, the shape of the body is fish-like and adapted for progression in the water; the jaws are armed with minute conical teeth; the blow-hole, on the top of the head, is transverse, crescentic, with the concavity forward. (For its anatomy see Dolphin.) There are several species in different parts of the world, some of which have a very wide geographical distribution; they are very



Common Porpoise (Phocæna communis).

active, living in shoals or flocks, and are frequently seen swimming and playing about vessels, running races with them, and leaping out of water. Their food consists chiefly of fishes and cephalopod mollusks; their flesh, dark-colored and gorged with blood, was once considered a delicacy, and is now often eaten by sailors; their blubber yields a very fine oil, and their skin makes an excellent leather. The common porpoise (*P. communis*, Cuv.) is from 4 to 6 ft. long, bluish black above with violet or greenish reflections, and white beneath; a little behind the middle of the back is a triangular cutaneous fold or dorsal fin; teeth 20 to 24 on each side in both jaws, compressed laterally, and curved somewhat backward; the lower jaw the longer; the pupil is V-shaped reversed, and the tongue festooned all round; the skin is smooth, perfectly destitute of hair and even of eyelashes, and beneath it is a layer of fat about an inch thick; there are no lips, and the small eyes are nearly in a line with the opening of the mouth; the opening of the ear is exceedingly small; neither the dorsal fin nor the tail has any internal bones, and the former consists of fat and is incapable of motion; the pectorals are brownish, though arising from a white part of the body; the brain is large, with numerous and deep convolutions over the cerebellum. There are four stomachs, and even six if all the constricted portions be counted as such; the walls of the first are strongly wrinkled, of the second very thick with longitudinal wrinkles of a pulpy consistence, the third membranous with numerous small pores, and the fourth wrinkled like the first; the intestine grows smaller to the anus, and the cæcum is absent. Gestation continues six months, and a single young one is produced at a birth, about 20 in. long, which is suckled and protected by the mother, as in other mammals; it can provide for itself at a year old. This species is common all about the coasts of Europe, extending even to the icy seas; they generally keep near the shores, where they root about with their snouts like hogs; they are often seen rolling and tumbling in the water, as they rise to the surface to breathe with a puffing sound; they look in the water like large black pigs, whence their common names. They pursue herrings, mackerel, salmon, and other fishes which swim in shoals, sometimes going far up rivers in their pursuit; they have been seen in the Thames at London, and in the Seine at Rouen, and even at Paris. The common porpoise of the American coast, formerly considered the same as the *P. communis* of Europe, was described as distinct by Prof. Agassiz in 1850, under the name of *P. Americana.* In size and color the two species are very much alike; the general form of the skull is different, the posterior surface in the European species being nearly vertical, but in the American much curved; the teeth of the latter are divided on the broad faces near the summit by grooves almost into three lobes, those of the former being smooth; the dorsal fin in the American is serrated and furnished with very characteristic tubercles, which are not mentioned in the descriptions of the European; the temporal groove of the skull is as wide as long in *P. Americana*, but narrower and oblong in *P. communis*. This species is common on our coast, chiefly in spring and summer, appearing in pursuit of the herring and other migratory fish; it should not be confounded with the cetacean called the sea porpoise, a true dolphin, and only seen off soundings. In former years it was captured in great numbers near the E. end of Long Island, in large seines from which they were harpooned and dragged on shore; from the blubber of each animal about six gallons of oil are obtained.—See "Marine Mammals of the Northwest Coast," by Charles M. Scammon (New York, 1874).

PORPORA, Nicolò, an Italian composer, born in Naples about 1686, died there in 1767. He was instructed by Scarlatti, and first brought himself into notice at Vienna, where he gained the approbation of the emperor Charles VI. In 1726 he entered upon a career of great success at Venice, and in 1728 went to Dresden as director of the theatre and of music in the court chapel. In 1731 he established at Naples a school of vocalism, in which Farinelli, Caffarelli, and other celebrated singers were educated. In 1733 he was engaged by a party opposed to Handel to direct a rival opera in London; but, although supported by Senesino, Cuzzoni, and Farinelli, he failed to make any impression and returned to Italy. About 1750 he established himself in Vienna, where Haydn came under his influence; and subsequently he became principal master at the Incurabili conservatory in Venice. Late in life he retired to Naples, and died in indigence. His works comprise 50 operas and a great number of masses, cantatas, sonatas, &c. He figures in George Sand's novel "Consuelo."

PORSENA, or **Porsenna, Lars**, a king of Clusium in Etruria, to whom, according to legendary Roman history, the Tarquins in the second year after their expulsion from Rome applied for assistance in recovering their kingdom. Porsena marched with an Etruscan army to the fortified hill Janiculum, and on his appearance the Romans fled to the Tiber and to the Sublician bridge, the defence of which was intrusted to Horatius Cocles, who held the Etruscans in check at one end while the bridge was broken down behind him, and then swam the river safely. Porsena besieged the city, but learning from C. Mucius Scævola, after the siege had lasted for some time, that 300 noble Romans had bound themselves by an oath to kill him, he made peace upon the reception of hostages, and retired to Clusium. This legend is believed by critics to veil the fact of a short subjugation of Rome by the Etruscans, which is implied by Pliny, Tacitus, and other writers.

PORSON, Richard, an English scholar, born at East Ruston, Norfolk, Dec. 25, 1759, died in London, Sept. 25, 1808. At the age of nine he was sent to a village school at Happisburgh, where he remained three years. His father, who was parish clerk of East Ruston, required him to repeat every night the lessons that he had gone through during the day; and to this early exercise of his memory may perhaps be attributed that retentive power for which it afterward became remarkable. When 15 years of age he was sent to Eton at the expense of some gentlemen of the neighborhood. He then knew by heart nearly the whole of Horace and Virgil, the Iliad, the Odyssey, and many parts of Cicero and Livy; and in his own opinion he acquired little at Eton but facility in Latin versification. In 1777, principally by the assistance of Sir George Baker, president of the royal college of physicians, he entered Trinity college, Cambridge, where he obtained a fellowship in 1782, and graduated M. A. in 1785. Conscientious scruples deterred him from subscribing to the thirty-nine articles, and he vacated his fellowship in 1791. In 1792 his friends subscribed £2,000, which was so invested as to give him for the rest of his life an income of £100 per annum; and he was made regius professor of Greek at Cambridge, with a salary of only £40 a year. In 1806, on the establishment of the London institution, he was appointed head librarian, with a salary of £200. His first attempts as an author were made in Dr. Maty's "Review" as early as 1783, and consisted of articles on Æschylus, Brunck's Aristophanes, Weston's Hermesianax, and other subjects. In 1786 he added some notes to an edition of Xenophon's Anabasis, and in 1790 published notes on *Toupii Emendationes in Suidam*. He first appeared as an author under his own name in the letters to Archdeacon Travis upon the contested verse 1 John v. 7, entitled "Letters on the Three Witnesses" (1790). He added a few short notes to the London edition of Heyne's Virgil, corrected the text of Æschylus for the Glasgow edition, prepared an edition of the "Hecuba," "Orestes," "Phœnissæ," and "Medea" of Euripides, collated the Harleian manuscript of the Odyssey for the Grenville Homer, and added notes, and corrected for the press the first volume of the edition of Herodotus printed at Edinburgh in 1806. He bestowed considerable pains on the restoration of the Greek text of the Rosetta stone. His *Notæ in Aristophanem* and *Notæ ad Pausaniam* were published in 1820, and the *Photii Lexicon* in 1822. The work entitled *Adversaria* was arranged after Porson's death from memoranda found among his papers. Sedentary and irregular habits impaired his constitution, and he has been described as an habitual drunkard, but apparently without truth, though he drank at times to intoxication. As a classical scholar and critic he has had few rivals. —See "Life of Richard Porson, M. A.," by the Rev. John Selby Watson, M. A. (8vo, London, 1861).

PORTA, Baccio della. See BARTOLOMMEO, FRA.

PORTA, Giambattista della, an Italian natural philosopher, born in Naples about 1540, died there, Feb. 4, 1615. He opened his house to a society of literary men called *i segreti*, whose meetings were finally prohibited by the court of Rome on the supposition that magic and other unlawful secrets were discussed at them. He travelled extensively over Europe, liberally aiding the establishment of private schools for the study of particular sciences, and of public academies. Late in life he wrote dramas, which are now forgotten. His investigations, though frequently absurd, have proved of great value. The theory of light is much indebted to his labors, and he was the inventor of the camera obscura and other optical instruments, including, it was formerly supposed, the telescope. He was a voluminous writer on a great variety of subjects, including natural magic, the art of secret writing, human physiognomy, landscape gardening, optics, curvilinear geometry, chemistry, meteorology, &c. His chief work is *De Humana Physiognomia* (Sorrento, 1586; Italian translation by himself, fol., Naples, 1598).

PORTAELS, Jean François, a Belgian painter, born at Vilvoorden in 1820. He studied in Brussels and under Delaroche in Paris, spent several years in Italy and the East, became director of the academy of Ghent in 1847, and was knighted in 1851. His principal paintings relate to oriental subjects, and include, besides a portrait of his patron Mehemet Ali, "The Drought in Judæa," "Fatima," "The Gypsy," "Rebecca," "Ruth," "A Caravan in Syria overtaken by a Simoom," "A Funeral in the Desert of Suez," "A Young Jewess of Asia Minor," "A Story-teller of Cairo," and "The Suicide of Judas." His masterpiece, representing "A Drought in Egypt," obtained in 1873 a special gold medal, awarded at the Sydenham crystal palace for the best picture.

PORTAGE. I. A N. E. county of Ohio, drained by Cuyahoga and Mahoning rivers; area, 500 sq. m.; pop. in 1870, 24,584. It is intersected by the Pennsylvania and Ohio canal, and by the Cleveland and Pittsburgh and the Atlantic and Great Western railroads. The chief productions in 1870 were 185,257 bushels of wheat, 356,953 of Indian corn, 426,814 of oats, 33,685 of barley, 263,449 of potatoes, 43,859 tons of hay, 200,308 lbs. of wool, 807,636 of butter, 714,718 of cheese, 1,888,400 of flax, and 236,753 of maple sugar. There were 6,373 horses, 17,135 milch cows, 9,561 other cattle, 45,386 sheep, and 6,421 swine; 23 manufactories of cheese, 2 of dressed flax, 3 flour mills, 25 saw mills, and 10 tanneries. Capital, Ravenna. **II.** A central county of Wisconsin, intersected by Wisconsin river and drained by several of its branches; area, 792 sq. m.; pop. in 1870, 10,634. It contains extensive pine forests, from which large quantities of lumber are rafted down the river. It is intersected by the Green Bay and Lake Pepin and the Wisconsin Central railroads. The chief productions in 1870 were 213,467 bushels of wheat, 58,657 of rye, 63,909 of Indian corn, 153,294 of oats, 112,707 of potatoes, 9,784 tons of hay, 25,911 lbs. of wool, 198,693 of butter, and 80,050 of hops. There were 1,427 horses, 3,024 milch cows, 1,663 working oxen, 3,035 other cattle, 8,542 sheep, and 3,608 swine; 1 flour mill, and 22 saw mills. Capital, Steven's Point.

PORTAGE, a city and the capital of Columbia co., Wisconsin, at the head of navigation on the Wisconsin river, and on the canal connecting the Fox and Wisconsin, at the junction of three divisions of the Milwaukee and St. Paul railroad, 32 m. N. of Madison and 85 m. W. N. W. of Milwaukee; pop. in 1870, 3,945. It has considerable trade with the surrounding country, and contains six boot and shoe factories, a foundery and machine shop, repair shops of the railroad, a tannery, two breweries, four carriage and wagon factories, a flouring mill, and a planing mill, water power being furnished by the canal. There are two banks, seven hotels, a fine court house and jail, a high school and three other school houses, two weekly newspapers, and eight churches.

PORTALIS, Jean Étienne Marie, a French statesman, born at Beausset, Provence, April 1, 1745, died in Paris, Aug. 25, 1807. He was an advocate at Aix, published a celebrated memorial "On the Validity of Protestant Marriages in France" (1770), and successfully conducted famous suits against Mirabeau and Beaumarchais. Having gone to Paris in the beginning of 1794, he was imprisoned till the death of Robespierre, and in 1795 was elected to the council of ancients. He was proscribed by the directory in 1797, and fled to Switzerland and thence to Holstein, returning to France in 1800, when he was appointed successively a member of the commission for drawing up the new civil code and a councillor of state. In 1801 he was appointed director of public worship, and was chiefly instrumental in drawing up the concordat and the organic articles, and in organizing the remodelled French church. He was made a senator in 1803, and designated as one of the five members of the institute representing the French academy. In 1804 he was appointed minister of the interior and public worship. A treatise by him on the philosophy of the 18th century and two collections of his public papers have been published.—His son, Count Joseph Marie (1778–1858), was minister plenipotentiary at Ratisbon in 1804, minister of the interior *ad interim* in 1807, councillor of state in 1808, and director general of the press in 1810, was banished in 1811 but recalled in 1813, and made president of the imperial court of Angers. He became ambassador in Rome in 1818, a peer of France in 1819, minister of justice in 1828 and of foreign affairs in 1829, and in the same year president of the court of cassation. Under Louis Philippe he was vice president of the house of peers, and under Napoleon III. a senator.

PORT-AU-PRINCE, a city, capital of the republic of Hayti, at the head of the bay of Gonaives, on the W. coast of the island; lat. 18° 33′ N., lon. 72° 21′ W.; pop. about 21,000. The town is on a rising ground. The streets, though generally wide, are ill paved and very filthy, and the houses, mostly built of wood, are generally dilapidated. Among the public edifices are the president's residence, the senate house, a church, the custom house, mint, and hospital. There are also a lyceum, a college, and a few schools. The surrounding country is for the most part marshy. Notwithstanding the extent and beauty of the bay of Gonaives, the roadstead of Port-au-Prince is small and shallow, and vessels drawing over 10 ft. of water are in danger of dragging on the muddy bottom. There is a monthly steam service to New York, and a very active coasting trade. Coffee, cacao, cotton, logwood, fustic, mahogany, tobacco, wax, tortoise shell, hides, molasses, and rum are exported. The climate is hot, moist, and unhealthy for foreigners; the mean annual temperature is 81° F., and the extremes 63° and 104°.—Port au-Prince, sometimes called Port Republican, was founded in 1749. It has suffered from earthquakes, especially those of 1751, 1770, and 1842, when the city was almost completely razed. Disastrous fires are common; that of January, 1843, destroyed one third of the houses.

PORT ELIZABETH, a free port of Cape Colony, S. Africa, in the district of Uitenhage, on the W. shore of Algoa bay, 400 m. E. of Cape Town; pop. about 10,000. Next to Cape Town it is the principal port, and has an arsenal and several churches. Its chief trade is with Great Britain, and to a small extent with the United States, particularly with Boston; the chief imports are tobacco, provisions, flour, shoes, farming implements, some cotton goods, and other manufactured articles.

PORTER, a kind of malt liquor. See Brewing.

PORTER, a N. W. county of Indiana, bordered N. by Lake Michigan and S. by the Kankakee river, and drained by Calumet river and

Coffee and Salt creeks; area, about 420 sq. m.; pop. in 1870, 13,942. It has a nearly level surface toward the north, which becomes rough and broken in the south; and the soil, principally occupied by forest and prairie, is generally fertile. It is traversed by several railroads. The chief productions in 1870 were 148,575 bushels of wheat, 212,331 of Indian corn, 178,886 of oats, 66,352 of potatoes, 220,998 lbs. of butter, 52,721 of wool, and 21,841 tons of hay. There were 5,087 horses, 4,405 milch cows, 7,644 other cattle, 15,200 sheep, and 10,039 swine; 5 manufactories of agricultural implements, 3 of bricks, 4 of carriages, 4 of cooperage, 1 of paper, 1 of woollens, 4 flour mills, 9 saw mills, 1 tannery, and 1 currying establishment. Capital, Valparaiso.

PORTER. I. David, an American naval officer, born in Boston, Feb. 1, 1780, died in Pera, Turkey, March 28, 1843. He entered the navy in April, 1798, and was a midshipman in the frigate Constellation in her action with the French frigate Insurgente, Feb. 9, 1799. In October, 1799, he became a lieutenant, and served on the West India station. In January, 1800, his schooner, the Experiment, while becalmed off the coast of Santo Domingo, with several American merchantmen under her protection, was attacked by ten barges, which after a conflict of seven hours were beaten off. Lieut. Porter was wounded in this engagement. Subsequently the Experiment had several successful affairs with privateers, and captured the French schooner La Diane, 14 guns and 60 men. In August, 1801, the schooner Enterprise, 12 guns, to which Porter was attached, fell in off Malta with a Tripolitan cruiser of 14 guns and 80 men, which surrendered after an engagement of three hours. Subsequently, while attached to the frigate New York, he commanded a boat expedition which destroyed several feluccas in the harbor of Tripoli, and was again wounded. In October, 1803, he was captured in the frigate Philadelphia, and remained a prisoner in Tripoli until peace was proclaimed. In April, 1806, he was made master commandant, and in July, 1812, captain. On the outbreak of the war of 1812 he sailed from New York in command of the frigate Essex, 32, and in a short cruise captured several British merchantmen and a transport with 150 troops on board. Soon afterward he fell in with and captured, after an action of eight minutes, H. B. M. S. Alert, of 20 18-lb. carronades, with a full crew. On Dec. 11 he captured near the equator the British government packet Norton, with $50,000 in specie on board. Capt. Porter continued to cruise in the south Atlantic and upon the coast of Brazil until the close of January, 1813, when he determined to proceed to the Pacific and destroy the English whale fishery in that ocean, and sailed for Valparaiso. Having there refitted, he went to sea, and on March 25 captured the Peruvian privateer Nereyda, of 19 guns, which had taken two American whale ships, and had their crews on board as prisoners. They were transferred to the Essex, and the armament and ammunition of the Nereyda were thrown overboard, when she was released. One of her prizes was shortly afterward recaptured and restored to her commander. After this, Capt. Porter cruised about ten months in the Pacific, capturing 12 British ships employed chiefly in the sperm whale fishery, amounting in the aggregate to 3,369 tons; 400 prisoners were made; and for the time that important British interest in the Pacific was destroyed. The Georgiana, whaler, was converted into a·vessel of war, named the Essex Junior, and cruised in company with the Essex. On Feb. 3, 1814, the Essex and Essex Junior arrived at Valparaiso. On the 8th H. B. M. frigate Phœbe and sloop Cherub arrived and anchored near the Essex, and after obtaining supplies cruised off Valparaiso six weeks. On March 28 the Essex made an attempt to get to sea, but in doubling a headland was struck by a squall, which carried away her maintopmast, and caused the loss of several men. In this crippled state the ship anchored 3 m. from the town, and was attacked by the Phœbe and Cherub. The Essex was a frigate of 860 tons, mounting 32 guns, 6 of which were long 12s, the rest 32-lb. carronades, with a crew of 255. The Phœbe was a frigate of 926 tons, mounting 46 guns, viz., 30 long 18s and 16 32-lb. carronades, with a crew of 320. The Cherub mounted 28 guns, viz., 18 32-lb. carronades, 8 24-lb. carronades, and 2 long 9s, with a crew of 180. At 4 P. M. the Phœbe, nearly astern of the Essex, opened her fire, the Cherub opening hers at the same time on the starboard bow, and the action continued 2 h. 30 m. The Essex Junior took no part in it, her armament of 18-lb. carronades being too light to be of the least service in such an action. The Essex finally surrendered, with a loss of 58 killed, 66 wounded, and 31 missing, who were probably drowned in attempting to swim ashore when the ship was on fire during the engagement; and when she surrendered, Capt. Porter and Lieut. McKnight were the only commissioned sea officers who remained unhurt. A large portion of her guns were disabled. The British loss was 5 killed and 10 wounded. The Essex Junior brought the survivors of the Essex to the United States, where Capt. Porter was received with great distinction. His narrative of this remarkable cruise was published in New York in 1822 (2 vols. 8vo). From April, 1815, to December, 1823, he was a member of the board of navy commissioners, which post he resigned to take command of an expedition fitted out against pirates in the West Indies. In October, 1824, upon evidence that a quantity of valuable goods had been carried by pirates to Faxardo on the E. end of Porto Rico, the Beagle, one of the schooners of the squadron, was sent there, but the officers on landing were thrown into prison. After their release

Com. Porter sailed for the island, landed a force of 200 men, and demanded an apology, which was given. The government, deeming that he had exceeded his powers, recalled him, and a court martial sentenced him to suspension for six months. He soon afterward resigned, and entered the service of Mexico as commander-in-chief of her naval forces, at a salary of $25,000 per annum. He remained in this service till 1829, when he returned to the United States, and was appointed by President Jackson consul general to the Barbary powers, from which post he was transferred to Constantinople as chargé d'affaires, and finally became resident minister there, which office he held when he died. His remains were interred in the grounds of the naval asylum at Philadelphia. He wrote "Constantinople and its Environs" (2 vols. 12mo, New York, 1835). **II. David Dixon**, an American naval officer, son of the preceding, born in Philadelphia in June, 1813. He entered the navy as midshipman in 1829, and became lieutenant in 1841. In the first 18 years of his service he is accredited with ten years' sea service in the Mediterranean, and the remainder of the time with duty in the coast survey and at the naval observatory. He served in the Mexican war, and then returned to the coast survey. On the discovery of gold in California he obtained leave from the navy department, and for three years commanded a mail steamer between New York and the isthmus of Panama. He afterward returned to the navy, and on the breaking out of the civil war in 1861 was ordered to supersede a post captain in command of the steam frigate Powhatan, which was despatched to aid in the reënforcement of Fort Pickens. For the expedition against New Orleans in 1862 Commander Porter organized and commanded a mortar flotilla; and in 1863 he was appointed acting rear admiral and assigned to command the Mississippi squadron, comprising in all 125 vessels with more than 1,300 officers. For his services in reducing Vicksburg, he received a commission as rear admiral, dated July 4, 1863. In the spring of 1864 he coöperated with Gen. Banks in the unsuccessful Red river expedition. In October he was transferred from the Mississippi to the North Atlantic blockading squadron, and directed to attack the defences of Wilmington. He appeared before Fort Fisher on Dec. 24, with 35 regular cruisers, 5 ironclads, and a reserve of 19 vessels. The bombardment continued through the next day, and was resumed on Jan. 13, 1865, by an augmented naval force, and kept up until the evening of the 15th, when the firing was stopped and the works were carried by a combined body of soldiers, sailors, and marines. Rear Admiral Porter was promoted to vice admiral, July 25, 1866, and became superintendent of the naval academy at Annapolis; and on the death of Farragut he succeeded him as admiral, his commission dating from Aug. 15, 1870.

PORTER, Ebenezer, an American clergyman, born in Cornwall, Conn., Oct. 5, 1772, died in Andover, Mass., April 8, 1834. He graduated at Dartmouth college in 1792, studied divinity at Bethlehem, Conn., and was ordained pastor of the Congregational church at Washington in that state in 1796. In 1812 he was appointed professor of sacred rhetoric at Andover theological seminary, of which institution he subsequently became president. He wrote "The Young Preacher's Manual" (1809); "Analysis of Vocal Inflection" (1824); "Analysis of the Principles of Rhetorical Delivery" (1827); and "Lectures on Homiletics and Preaching, and on Public Prayer, with Sermons and Addresses" (1834). A collection of his "Lectures on Eloquence and Style" was published by the Rev. L. Matthews (8vo, Andover, 1836).

PORTER, Fitz John, an American soldier, born in Portsmouth, N. H., in 1823. He graduated at West Point in 1845, and served in garrison at Fortress Monroe until the opening of the Mexican war. He was engaged in the siege of Vera Cruz, and in the battles of Cerro Gordo, Contreras, Molino del Rey, Chapultepec, and the assault upon the city of Mexico, in which he was wounded at the Belen gate, and was successively brevetted as captain and major. He was afterward on garrison duty in various places till 1849, when he became instructor of artillery and cavalry at West Point. From 1855 to 1860 he served in various capacities, being from 1857 to 1860 assistant adjutant general of the Utah expedition. At the commencement of the civil war he acted as chief of staff in the department of Pennsylvania and in the valley of the Shenandoah. He was made colonel in the regular army and brigadier general of volunteers in May, 1861, and placed in command of a division in the defences of Washington. At the opening of the peninsular campaign he commanded his division, and was superintendent of the siege of Yorktown. In May, 1862, he was assigned to the command of the 5th corps of the army of the Potomac. He commanded at the battle of Hanover Court House, May 27, and at Cold Harbor, June 27, and was made major general of volunteers. At the battle of Malvern Hill, July 1, he was in virtual command, posting all the corps as they came upon the field. He commanded his corps during Pope's campaign in northern Virginia. At the second battle of Bull Run his corps, though ordered to advance, failed to appear on the field on Aug. 29, but in the afternoon of the 30th was more actively engaged than any other, nearly a quarter of its members being killed or wounded; to their obstinate resistance it was mainly due that the defeat was not a total rout. His corps took part in the campaign in Maryland, and was present at the battle of Antietam, Sept. 17; but it was kept in reserve by McClellan, and was only slightly engaged. Pope was greatly displeased with the conduct of Porter at and near Bull Run, Sept. 27-30, and in November preferred charges against him. A court martial was ordered, which began its proceedings on Dec. 1, the charges being now brought, not by Pope, but by Gen. Roberts, who had been Pope's inspector general. The trial continued till Jan. 10, and resulted in a verdict of guilty; and Porter was sentenced, Jan. 21, to be cashiered and "for ever disqualified from holding any office of trust or profit under the government of the United States." The justice of this verdict has been a subject of much controversy. After leaving the army he engaged in business in New York, was subsequently superintendent of the construction of the New Jersey asylum for the insane, and in February, 1875, was appointed commissioner of public works in the city of New York.

PORTER. I. Jane, an English novelist, born in Durham in 1776, died in Bristol, May 24, 1850. She lost her father in childhood, was educated at Edinburgh, and afterward removed to London with her mother and sister. Here she published "Thaddeus of Warsaw," which was translated into several languages, and obtained for her admission as a lady canoness into the Teutonic order of St. Joachim. In 1809 she published "The Scottish Chiefs," a novel founded on the adventures of Bruce and Wallace, which also was very popular. "The Pastor's Fireside," "Duke Christian of Luneburgh," "The Field of Forty Footsteps," and "Sir Edward Seaward's Diary" (1831) are her other most important works. The last is a work of fiction, but so life-like that a leading review discussed it as veritable history. In 1841 Miss Porter accompanied her brother, Sir Robert Ker Porter, to St. Petersburg, and after his death returned to England. **II. Anna Maria,** sister of the preceding, born in Durham about 1781, died near Bristol, June 21, 1832. In her childhood she was much in the company of Walter Scott, who delighted in relating stories to her. Her first works were two collections of "Artless Tales" (1793 and 1795), besides which she wrote "Walsh Colville" (1797), "Octavia" (3 vols., 1798), "The Hungarian Brothers" (1807), "Don Sebastian" (1809), "Ballad Romances and other Poems" (1811), "The Recluse of Norway" (1814), "The Village of Mariendorpt" (1818), "The Fast of St. Magdalen" (1821), "The Knight of St. John," in conjunction with her sister Jane, and "Tales round a Winter's Hearth" (1826).

PORTER, Noah, an American scholar, eleventh president of Yale college, born in Farmington, Conn., Dec. 14, 1811. He graduated at Yale college in 1831, taught school in New Haven for two years, and then for two years was tutor in the college. He studied theology there, and in April, 1836, became pastor of the Congregational church in New Milford, Conn. He was pastor of a Congregational church in Springfield, Mass., from 1843 to 1846, when he was chosen Clark professor of metaphysics and moral philosophy in Yale college; and he was elected president of that institution on the retirement of President Woolsey in 1871. He received the degree of D. D. from the university of New York in 1858, and that of LL. D. from Western Reserve college in 1870, and from Trinity college, Hartford, in 1871. He spent a year in Europe in 1853–'4, chiefly in Germany. He superintended, as principal editor, the preparation and issue of the new revision of Webster's "American Dictionary of the English Language," which appeared in 1864. The most elaborate of his works is the treatise on "The Human Intellect, with an Introduction upon Psychology and the Soul" (New York, 1868), an abridgment of which was published in 1871. He has also published "The Educational Systems of the Puritans and the Jesuits Compared," a prize essay (New York, 1851); "Books and Reading" (1870); "American Colleges and the American Public" (New Haven, 1870); and "The Sciences of Nature versus the Science of Man" (1871), a review of the philosophical opinions of Herbert Spencer.

PORTER, Peter Buel, an American soldier, born in Salisbury, Conn., Aug. 14, 1773, died at Niagara Falls, March 20, 1844. He graduated at Yale college in 1791, studied at the Litchfield law school, and in 1795 began practice at Canandaigua, N. Y. In 1808 he was chosen a representative in congress, where as chairman of the committee on foreign relations he prepared and introduced the celebrated report of December, 1811, recommending war against Great Britain. As soon as hostilities had been declared he resigned his seat in congress, and, refusing a commission as general in the regular army, was appointed quartermaster general of New York, and subsequently received the command of a body of Pennsylvania and New York volunteers and Indians of the Six Nations. Black Rock, where he resided, having fallen into the hands of the British in June, 1813, and his own house being made their headquarters, he rallied a force by which they were expelled, and their commander, Col. Bishop, mortally wounded. He held a command in Smythe's unfortunate "army of invasion," and was twice permitted to embark to lead the van of the army into Canada, and twice recalled before he reached the opposite shore. His comments on this led to a duel between him and Gen. Smythe. In July, 1814, he joined Brown's invading army with a brigade of 3,500 volunteers and Indians. He exhibited "great personal gallantry" at Chippewa, and led the volunteers at Lundy's Lane. Besieged with Brown in Fort Erie, he led the brilliant and effective sortie of Sept. 17. Passing during the engagement with his staff from one column to another, he came suddenly upon about 80 English soldiers, separated from the main body, and bewildered in the *mêlée*. He went up to them, putting on a bold face, and saying: "That's right, my good fellows! surrender, and I'll take care of you," at the same time throwing down the muskets of those nearest to him. He received a gold medal from congress, and a sword from the state. Gen. Porter was one of the earliest projectors of the Erie canal, and was named, with Morris and Clinton, on the first board of commissioners to explore a route for it. In 1816 he was appointed commissioner for determining the N. W. boundary. In May, 1828, he was appointed secretary of war by President Adams.

PORTER, Sir **Robert Ker,** an English artist, brother of Jane and Anna Maria Porter, born in Durham about 1775, died in St. Petersburg, May 4, 1842. He entered the royal academy when he was about 15 years old, and after two years was commissioned to paint pictures of Moses and Aaron for Shoreditch church. His best productions were battle pieces. His "Storming of Seringapatam," which was exhibited in 1800, was 120 ft. long, and is said to have cost him only six weeks' labor. It was destroyed by fire. He also painted "The Siege of Acre," "Agincourt," "The Battle of Alexandria," and "The Death of Sir Ralph Abercromby." In 1804 he went to Russia, where he was appointed historical painter to the czar, and painted on the walls of the admiralty "Peter the Great planning the Port of Cronstadt and St. Petersburg." Returning to England, he published "Travelling Sketches in Russia and Sweden" (2 vols. 4to, 1808); accompanied Sir John Moore's expedition to the Peninsula in 1808; wrote anonymous "Letters from Portugal and Spain" (1809); and made a second visit to Russia, where in 1811 he married the daughter of Prince Shtcherbatoff. In 1813 he published "An Account of the Russian Campaign." From 1817 to 1820 he travelled in Asia, engaged in antiquarian studies, which are detailed in his "Travels in Georgia, Persia, Armenia, ancient Babylonia," &c. (2 vols. 4to, 1821-'2). In 1826 he was appointed British consul at Carácas, where he painted three of his best pictures, "Christ at the Last Supper blessing the Cup," "Our Saviour blessing the Little Child," and an *Ecce Homo*. He went with his sister Jane to St. Petersburg, and died of apoplexy as he was about returning home. He was knighted in 1813.

PORTEUS, Beilby, an English prelate, born in York, May 8, 1731, died in London, May 14, 1808. He was a sizar of Christ's college, Cambridge, where he obtained a fellowship. He first became known as a writer by his prize poem on death. In 1762 he became chaplain to Dr. Secker, archbishop of Canterbury, by whom he was presented to several benefices, and in 1769 chaplain to George III. and master of the hospital of St. Cross, near Winchester. In 1776 he was made bishop of Chester, and in 1787 was promoted to the diocese of London, over which he presided till his death. He established a fund for the relief of the poorer clergy of his diocese, and founded three prizes in Christ's college, Cambridge. His collected works, including sermons, tracts, a "Summary of Christian Evidences," a "Life of Archbishop Secker," &c., with a life by his nephew the Rev. Robert Hodgson, were published in 1811 (6 vols. 8vo, London).

PORT GLASGOW, a town of Renfrewshire, Scotland, on the left bank of the Clyde, 4 m. S. E. of Greenock; pop. in 1871, 10,823. It was made a free port in 1668, but greatly declined after the rise of Greenock and the improvements on the Clyde. The shipping is now almost entirely devoted to the American timber trade. The imports in 1872 amounted to £275,226, and the exports to £108,806. Ship building is carried on extensively; rope, canvas, and other articles are manufactured; and there are several large sugar refineries.

PORT HOPE, a town, port of entry, and the capital of Durham co., Ontario, Canada, on the N. shore of Lake Ontario, at the S. terminus of the Midland railway, and on the Grand Trunk line, 60 m. E. by N. of Toronto; pop. in 1871, 5,114. It is built in a valley and on the side of a hill commanding fine views of the lake. The streets are lighted with gas. Good water power is furnished by Smith's creek, which flows through the town. The harbor is one of the best on the lake, and the trade in lumber and grain is considerable. The value of imports for the year ending June 30, 1874, was $251,004; of exports, $1,474,853. Port Hope contains five flouring mills, a plaster mill, a planing mill, a distillery, two breweries, manufactories of woollens, buttons, leather, wooden ware, steam engines, machinery, iron castings, &c., three branch banks, two weekly newspapers, and five or six churches.

PORT HURON, a city and the county seat of St. Clair co., Michigan, port of entry of the customs district of Huron, on the St. Clair river and at the mouth of Black river, which is here crossed by two bridges, 1½ m. from the foot of Lake Huron, 58 m. N. N. E. of Detroit, and 110 m. E. by N. of Lansing; pop. in 1860, 4,371; in 1870, 5,973; in 1874, 8,240. It is the terminus of the Chicago and Lake Michigan railroad, and by ferry to Port Sarnia, Canada, on the opposite side of the St. Clair river, it connects with the Great Western line. The Grand Trunk railway crosses the St. Clair at Fort Gratiot, 1½ m. N., to which point two horse railroads have been constructed. The Black river brings down immense quantities of logs, which give employment to a large number of lumber and shingle mills. There are also three ship yards and two dry docks. The trade in fish is important. The customs district embraces all the coast of the state bordering on Lake Huron, and has a large domestic and foreign commerce. The traffic by rail with Canada is extensive. The city has a fire department, gas works, water works, a fine court house, two national and two private banks, a savings bank, several hotels, four large public school houses, two daily and three weekly newspapers, and nine churches. The first frame house on the site of Port Huron was erected in 1819. It was incorporated as a village in 1835, and as a city in 1857.

PORTICI, a town of Italy, in the province and 5 m. S. E. of the city of Naples, beautifully situated on the gulf of Naples, and on the slope of Mt. Vesuvius near the site of Herculaneum; pop. about 12,000. The railway to Salerno passes through the courtyard of the magnificent palace built toward the middle of the 18th century by Charles III. on the lava of Vesuvius, at the head of the bay, and now belonging to the municipality of Naples. Beyond the palace is the village of Resina, built upon the tufa and lava which covered Herculaneum. The bay of Portici is one of the finest in Italy. Ribbons are manufactured, and there are large fisheries and trade in fruit and wine.

PORT JERVIS, a village of Orange co., New York, on the Delaware river at the mouth of the Nevisink, and on the Erie railroad and the Delaware and Hudson canal, 100 m. S. S. W. of Albany, and 60 m. N. W. of New York; pop. in 1870, 6,377; in 1875, about 8,500. It is at the intersection of the boundary lines of the states of New Jersey, New York, and Pennsylvania. The scenery is very fine, and attracts many summer visitors. The village contains extensive railroad shops, a number of manufactories, two national banks, a savings bank, graded public schools, a daily, a tri-weekly, and two weekly newspapers, and six churches.

PORTLAND, a city and port of entry, capital of Cumberland co., Maine, the largest city in the state, on an arm of the S. W. side of Casco bay, in lat. 43° 39′ N., lon. 70° 15′ W., 63 m. by rail S. S. W. of Augusta, and 108 m. N. N. E. of Boston; pop. in 1800, 3,704; in 1850, 20,815; in 1860, 26,341; in 1870, 31,413; and in 1875, 34,420. The corporation includes several small islands in the bay, but the city proper stands on a peninsula, about 3 m. long, with an average breadth of ¾ m., extending easterly into the bay, with the surface rising from the sides and forming an elevated ridge which terminates at its extremities in two considerable hills. The greater part of the city is regularly laid out and well built, principally of brick, and it is remarkable for the elegance of many of the houses. It is lighted with gas. Many of the streets are lined with elm and other shade trees, and the principal ones are traversed by horse cars. The new custom house, erected at a cost of $485,000, is an elegant granite building, with elaborate marble ornamentation within. The post office is a beautiful structure of white Vermont marble, in the mediæval Italian style, with an elegant portico supported by Corinthian columns. Portland has 30 churches. The city hall is one of the largest and most elegant public buildings in the country. Its front of olive-colored freestone, elaborately dressed, is 150 ft. long, and surmounted with an elegant dome 160 ft. high; the height of the corner towers is 75 ft., and the depth of the building 221 ft. It contains a hall 118 by 80 ft., capable of seating 2,500 persons. It cost about $275,000, and covers an area of 26,155 sq. ft. The Maine charitable mechanic association, incorporated in 1815, has erected a substantial granite and brick building in Congress street, which contains a fine hall, library, and other rooms, and cost $36,000. Its library, intended for the use of members and apprentices, numbers more than 5,000 volumes. The elevated situation of the city affords fine views of Casco bay with its numerous islands, which are favorite summer resorts. Lincoln park, in the central portion of the city, contains about 2¼ acres. Evergreen cemetery, containing 55 acres, is about 2¼ m. distant, and there are two cemeteries in the city, the eastern and western. Seven railroads have their termini at Portland, viz.: the Grand

Portland.

Trunk, the Boston and Maine, the Maine Central, the Portland and Ogdensburg, the Portland, Saco, and Portsmouth, the Portland and Rochester, and the Androscoggin. The Grand Trunk line extends from Portland *via* Montreal and Toronto to Port Sarnia, at the foot of Lake Huron, thence connecting with Detroit, a distance of 856 m. The commercial facilities of the city have recently been much extended by the construction of a marginal railroad of nearly 5 m. around the water front, enabling cars to pass directly to nearly all the wharves. There is a daily line of steamers to Boston, and steamers also make frequent and regular trips to New York, St. John, Halifax, and various points on the Maine coast. The Allan line of mail steamships (weekly) and a fortnightly line ply between Liverpool and Portland during the winter, and in the same season there is a freight line at irregular intervals from Glasgow. These lines during the season of navigation in the St. Lawrence run to Montreal and Quebec. The harbor is deep enough for vessels of the largest class, is very extensive and well sheltered by several islands, and in the most severe winters is seldom closed by ice. It is of easy access, and the principal entrance, which lies between the mainland and House island, is defended by Fort Preble on the former and Fort Scammel on the latter. There is also a granite casemated fort on Hog Island ledge in the harbor, commanding the four entrances. The foreign trade is chiefly carried on with the West Indies, South America, and Europe, the exports being for the most part provisions, lumber, ice, and fish, and the imports molasses, sugar, crockery, salt, and iron. The value of imports during 1874 was $25,922,966; of exports, $26,665,646; total foreign commerce, $52,588,612. The value of the foreign commerce in 1873 was $51,244,692; in 1872, $43,988,754; in 1871, $38,417,526; in 1870, $32,097,240. More than four fifths of these sums represent goods received at Portland and immediately transshipped to Canada; the remainder is the foreign commerce proper of the port. The number of entrances from foreign ports in 1874 was 386, tonnage 240,248; clearances for foreign ports, 759, tonnage 268,952; entrances in the coastwise trade, 805, tonnage 574,494; clearances 626, tonnage 555,935; built during the year, 33 vessels, tonnage 16,276; built in 1873, 18 vessels, tonnage 7,814; belonging in the district on March 1, 1875, 419, tonnage 110,771; on March 1, 1873, 372, tonnage 90,610. In 1874 there were 112 vessels, tonnage 2,751, employed in the cod and mackerel fisheries. The imports in 1874 included 7,635 hhds., 587 boxes, and 15,100 bags of sugar, and 21,080 hhds. of molasses; the exports, 412,939 sugar box shooks, 283,126 hogshead shooks and heads, 24,786 pairs heading, 1,462,237 hoops, 20,772,991 ft. of lumber, and 6,413 empty casks. The lumber was mostly received from Canada, and the greater part of it was shipped to South America. The receipts of lumber in 1873 amounted to about 150,000,000 ft. The sales of merchandise in the Portland market are estimated to amount to $40,000,000 a year. The receipts of produce by rail for five years have been as follows:

PRODUCE.	1870.	1871.	1872.	1873.	1874.
Flour, barrels..	545,259	482,523	488,764	552,227	668,777
Wheat, bushels	896,101	263,898	240,687	185,840	401.745
Corn, bushels..	585,641	810,068	806,487	474,847	670,538
Oats, bushels..	414,475	197,780	822,178	255,451	242,816
Barley, bushels	77,954	52,279	59,764	86,898	84,479
Peas, bushels..	92,704	71,155	168,019	65,946	250,290

The annual value of manufactures is about $9,000,000. The principal articles of manufacture are boots and shoes, moccasins, refined sugar, rolling mill and foundery products, machinery, locomotives, engines and boilers, kerosene, matches, hydraulic cement pipe, kerosene burners and chemicals, leather, varnish, paints, soap, carriages and sleighs, edge tools, jewelry, and stone ware. The canning of corn and lobsters is extensively carried on. Ship building is an important industry of the vicinity, and there are two dry docks for the repair of vessels in the city. It contains six national banks, with an aggregate capital of $3,050,000; a state bank; two savings banks, with deposits to the amount of about $8,000,000; a safe deposit company; and three insurance companies.—Portland is divided into seven wards, and is governed by a mayor and a board of alderman of one member and a common council of three members from each ward. It has an organized police force and a good fire department. Water works have been constructed by a company organized in 1867, which supply the city from Sebago lake, 17 m. distant. It is brought to a reservoir containing 12,000,000 gallons on Bramhall's hill in the W. part of the city, and is thence distributed to the buildings of whatever height. The assessed valuation of property in 1874 was $30,723,936 ($18,141,200 real and $12,582,736 personal), an increase of $900,000 over the previous year. The taxation for the year ending with March, 1875, amounted to $792,710 40, viz.: $147,274 42 for state, $34,019 23 for county, and $611,416 75 for city purposes; besides which there were receipts from city property amounting to $96,830. The total city debt March 31, 1874, was $5,195,800, including $2,347,000 bonds loaned to railroad and other companies and secured by mortgage; sinking fund, $570,332 31; net debt, $4,625,467 69. Sessions of the United States courts for the district of Maine are held here. The principal charitable institutions are the almshouse, female orphan asylum, home for aged women, dispensary, and Maine general hospital, incorporated in 1868 and recently opened, besides a number of benevolent associations. There are 19 public schools, viz.: 1 high, 4 grammar, 2 with grammar and primary grades, 1 intermediate, 9 primary, and 2 ungraded. The number of persons of school age (4 to 21) in 1874 was 10,-

134; number of pupils registered during the term ending in February, 1875, 5,442; average attendance, 4,242. The amount raised for the support of the schools for the year ending with March, 1875, was $89,700. There is a medical school, incorporated in 1858. The Portland society of natural history was organized in 1843 and incorporated in 1850. Its valuable collections have been twice burned, in 1854 and 1866. Since the latter date a new cabinet has been commenced, which already contains many valuable specimens. The Portland institute and public library, incorporated in 1867, has 15,000 volumes, and the mercantile library, established in 1851, 5,000 volumes collected since the fire of 1866, which destroyed the former collection of 4,000. The Portland Athenæum, incorporated in 1826, had a fine building and a library of 12,000 volumes, which were burned in 1866. A new building has been erected, but the library has not been replaced. Three daily, one tri-weekly, and seven weekly newspapers are published. There are 35 religious societies, viz.: 1 Advent Christian, 2 Baptist, 9 Congregational, 3 Episcopal, 1 Freewill Baptist, 1 Friends', 1 Lutheran (Swedish), 6 Methodist, 2 Roman Catholic, 1 Second Advent, 2 Spiritualist, 1 Swedenborgian, 2 Unitarian, 2 Universalist, and 1 undenominational.—The Indian name of Portland was Machigonne. An English colony settled here in 1632, but during the wars with the Indians, French, and the mother country, it suffered very severely, and the town was three times completely destroyed. Portland, which originally formed a part of Falmouth, was incorporated as a town in 1786, and as a city in 1832. It was visited by a conflagration on July 4 and 5, 1866, which swept away nearly a third of the city, destroying property to the value of $10,000,000. The burned district has since been rebuilt.

PORTLAND, the chief city of Oregon, capital of Multnomah co., and port of entry of the district of Willamette, on the W. bank of the Willamette river, 12 m. above its mouth in the Columbia, and 122 m. by these rivers from the Pacific ocean, 50 m. N. of Salem, and 580 m. N. of San Francisco; lat. 45° 30′ N., lon. 122° 27′ W.; pop. in 1860, 2,874; in 1870, 8,293, of whom 456 were Chinese; in 1875, 12,500. It is the head of ship navigation, and is built on a plateau rising gradually from the river, a range of fir-covered hills surrounding it in a semicircle on the west, and commanding fine views of the Willamette valley with the Cascade mountains in the distance. The streets are regularly laid out, well paved, lighted with gas, and except in the business portion shaded with maples. There is a line of horse cars. A park 300 ft. wide extends almost the entire length of the city. There are many handsome residences and substantial business structures. The chief public buildings are the custom house, the masonic and odd fellows' halls, the market, and the county buildings. Portland is the N. terminus of the Oregon Central railroad, and is connected by two ferries with East Portland (pop. in 1870, 830) on the opposite bank of the Willamette, the N. terminus of the Oregon and California railroad. These two lines traverse the fertile Willamette valley, and are ultimately to connect with the California railroad system. A semi-weekly line of steamers runs to Victoria, British Columbia, a tri-monthly line to San Francisco, and a monthly line to Victoria and Sitka, Alaska. There are also frequent lines to various points on the Columbia and Willamette rivers. A daily line to Kalama, Washington territory, 50 m. distant, connects with the Pacific division of the Northern Pacific railroad for points on Puget sound. The trade and commerce of Portland are increasing rapidly, the chief articles of shipment being wheat, flour, salmon, and lumber. Its foreign commerce has mostly grown up since 1868. In 1868–'9 the shipments of wheat amounted to 69,476 cwt. and of flour to 107,671 bbls., together valued at $589,813. In 1873–'4 the shipments were 1,304,810 cwt. of wheat and 230,211 bbls. of flour, valued at $4,037,093. The greater part of the wheat is exported to the British isles, while the flour is shipped to San Francisco, New York, Liverpool, China, and Japan. The entrances in the foreign trade of the district for the year ending June 30, 1874, were 49, tonnage 25,651; clearances, 75, tonnage 43,661; value of imports, $490,217; of exports, $1,953,539; entrances in the coastwise trade, 157, tonnage 121,519; clearances, 79, tonnage 83,129; vessels registered, &c., 61, tonnage 17,769. The chief manufactories are five iron founderies, three saw and planing mills, three breweries, two nail factories, a soap factory, two carriage factories, two manufactories of boots and shoes, two of boxes, one of brooms, two of furniture, and one of hats. There are a national bank, with a capital of $250,000, and three other banking institutions, with an aggregate capital of $1,500,000.—The city is governed by a mayor and a common council of nine members, three from each ward. There are a fire department and a police force. Water is supplied from the river by works constructed for the purpose. The United States courts for the district of Oregon are held here. In East Portland is the state hospital for the insane. The principal charitable institution in the city is an orphans' home. The public schools include a high school and intermediate and primary grades. There are also a colored school, a school for Chinese, and a number of private and denominational schools. The principal are the Bishop Scott grammar and divinity school and St. Helen's hall, under the charge of the Episcopalians; the Portland academy and female seminary; the independent German school; and St. Mary's academy and St. Michael's college, under the control of the Roman Catholics. The library association of Portland has a reading room and a library of 6,000 volumes. There are 2 daily, 1 semi-weekly, and 11 weekly (1 German) newspapers, and 16 places of worship, viz.: 1 Baptist, 1 Chinese, 2 Congregational, 3 Episcopal, 2 Jewish, 3 Methodist (1 colored), 1 Presbyterian, 2 Roman Catholic, and 1 Unitarian.—Portland was laid out in 1845, and became a city in 1851. On Aug. 2, 1873, a conflagration destroyed more than $1,000,000 worth of property, since which many brick buildings have been erected.

PORTLAND, New Brunswick. See SAINT JOHN.

PORTLAND, Isle of, a peninsula and parish of Dorsetshire, England, projecting into the English channel, 3 m. S. of Weymouth, about half way between Portsmouth and Plymouth, and 50 m. S. W. of Southampton; pop. of the parish in 1871, 9,907, including convicts, soldiers, and non-residents employed on government works. It is nearly 4 m. long by 1 to 1¼ m. broad, and 9 m. in circumference, varies in height from 458 ft. to less than 50 ft., and is surrounded on all sides by inaccessible cliffs, excepting on the north opposite Weymouth, which is the only landing place. It is still called an island, although it has been for centuries connected with the mainland at Abbotsbury by Chesil Bank, an irregular ridge of loose shingle 10 m. long and dangerous to navigation. At the S. extremity of the rocky hills is Portland Bill (anc. *Vindelia Promontorium*), a name occasionally given to the whole peninsula on account of its beak-like shape. On the north stands the ponderous Portland castle, erected by Henry VIII. about 1520, which defends the coast and is occupied by the lieutenant governor of Portland. The place is especially celebrated for a stupendous breakwater completed in 1872 (see BREAKWATER), and for its freestone, called Portland stone, consisting of three kinds; the lowest strata are the whitest and finest, and some of the stones weigh from 5 to 14 tons each. St. Paul's cathedral and many other great structures in London have been built of this stone, of which about 40,000 tons are exported annually, and the quarries are connected by a railway with the pier. As many as 700,000 tons a year were at various periods used for the breakwater. Connected with the latter are a naval station, a harbor of refuge, and batteries. A penal settlement was established here in 1848. The prison is built on elevated ground in a place called "The Grove," and has eight wings, accommodating 1,500 convicts, besides a hospital, a chapel, barracks, and cottages for the wardens. Hundreds of the convicts were employed on the breakwater. The fisheries are extensive, especially of mackerel. The soil in the vicinity is exceedingly fertile, and sheep raised in large numbers yield the famous Portland mutton. In the neighborhood are Pennsylvania castle, built by a member of the Penn family, and the ruined Rufus or Bow and Arrow castle, built by King William Rufus. William and Henry Bentinck were respectively created earl and duke of Portland in 1689 and 1716.

PORT LOUIS, the capital of the island of Mauritius, on its N. W. coast, at the head of a triangular bay about 10 sq. m. in area; pop. about 40,000. It is well protected to seaward by forts which command the narrow channel opening into the bay, and by a strong citadel which commands all approaches. The town is open to the ocean on one side, and on the other sides enclosed by picturesque mountains. It is very regularly built, the streets crossing each other at right angles; but it is badly paved and drained. The Champ de Mars is a beautiful semicircular plain, used as a parade ground for the garrison and a race course. There are few fine buildings, and but slight attempts at ornamentation of the town. The government house, barracks, and many other large buildings, begun or erected by the French, are still in fair preservation, but are inconvenient and unattractive. A conspicuous structure is the large railway station, the terminus of the Northern and Midland railways, which have been constructed within the past 12 years to connect Port Louis with Grand river, 30 m., and Mahébourg, 35 m. distant. A dry dock was opened in 1859, capable of taking in a vessel 365 ft. long; it is 80 ft. wide at the top and 40 at bottom, and has 23 ft. of water on the sill at high tide. Two lighthouses have been completed, the main light on Flat island, with a subsidiary one on Cannonier point. Mail steamers arrive monthly. There are convents, churches, and schools, a theatre, and a considerable number of large commercial houses. Of late years the prosperity of Port Louis has declined, fevers having become so prevalent that many have deserted it for other towns.

PORT MAHON, the capital of the island of Minorca, 2 m. from the mouth of a bay of the Mediterranean, in lat. 39° 52′ N. and lon. 4° 20′ E.; pop. about 12,000. The city is of modern construction, and contains some fine public buildings and several schools and charitable institutions. Many of the houses are built on ledges of rock projecting over the sea. They are usually of stone, and have a neat and attractive appearance. The bay forms one of the finest harbors in the Mediterranean. It extends about 5 m. inland, having a narrow entrance between ledges of rock. It is defended by batteries mounting heavy guns. Port Mahon is a naval station, and has salt works and establishments for preserving oysters; but there are few manufactures.

PORTNEUF, a county of Quebec, Canada, on the N. bank of the St. Lawrence, just above Quebec; area, 7,256 sq. m.; pop. in 1871, 23,216, of whom 20,296 were of French and 1,875 of Irish origin or descent. It is watered by the St. Maurice, Batiscan, and St. Anne rivers, and other streams. Capital, Cap-Santé.

PORTO ALEGRE, a maritime city of Brazil, capital of the province of São Pedro or Rio Grande do Sul, on the Rio Jacuhy, near its mouth, 710 m. S. W. of Rio de Janeiro; pop. about 15,000. The streets are regularly laid out and lighted with gas. The principal public buildings are the cathedral, town hall, treasury, Brazilian and Portuguese hospitals, and a college. There is a fine theatre, and the shops are among the handsomest in the empire. The harbor is exceedingly beautiful, and three lines of steamers are owned in the town. A railway to Santa Catharina is in process of construction (1875). In the environs, which are extremely picturesque, are two orphan asylums.

PORTO BELLO, Puerto Bello, or **Puerto Velo,** a seaport of the United States of Colombia, on the N. coast of the isthmus and 40 m. N. of the city of Panama; pop. about 3,500. It is situated at the foot of a mountain extending almost to the shore, and is divided into two quarters, the eastern of which, called Guinea, is mostly inhabited by negroes and other persons of color. The only public edifice of note is the old custom house erected in the 16th century. The port, formed by a narrow inlet of the sea, is defended on the north by the castle Todo-Hierro, and on the south by Fort Gloria. This port, for about two centuries the resort of the galleons engaged in transporting to Spain the precious metals and other commodities from the Pacific coast *via* Panama, though repeatedly surprised by the buccaneers, was a flourishing place until 1739, when it was captured and dismantled by Admiral Vernon, and the trade began to be carried on by way of Cape Horn.

PORTO FERRAJO, a town of Italy, in the province of Leghorn, capital of the island of Elba, situated on a promontory of the N. coast, on a fine bay of the Mediterranean, about 12 m. S. W. of Piombino; pop. nearly 4,000. It is strongly fortified and well built, and has a good harbor. The principal export is iron. In antiquity it was called Portus Argous, after the Argonauts. In the vicinity are Roman ruins and the villa in which Napoleon I. resided. (See ELBA.)

PORTO MAURIZIO, a province of N. Italy, in Liguria, bordering on Coni, Genoa, and Nice; area, 467 sq. m.; pop. in 1872, 127,058. It comprises the former provinces of Oneglia and San Remo, and some territory which Italy retained from Nice, and is divided into the districts of Porto Maurizio and San Remo. Although very mountainous, it is fertile, but the sea winds injure agriculture, especially when the irrigation is inadequate, and the productions are not sufficient for home consumption. Most of the district of San Remo is covered by the Maritime Alps, and according to some it is the most salubrious of all the regions on the Mediterranean. Capital, Porto Maurizio.

PORTO PLATA. See PUERTO PLATA.

PORTO RICO, or **Puerto Rico,** the smallest and most easterly of the Greater Antilles, West Indies, belonging to Spain, lying between lat. 17° 55′ and 18° 30′ N., and lon. 65° 39′ and 67° 11′ W.; area, including its dependencies, the isles of Viéques, Culebra, and Mona, 3,530 sq. m.; pop. about 625,000, of whom 338,000 are white and the remainder colored. It is separated from Santo Domingo on the west by the Mona passage, in which lies the island of Mona, and from the Virgin islands on the east by the Virgin passage, in which are Viéques and Culebra. It is nearly a rectangle, the length of which E. and W. is about 100 m., and the breadth N. and S. about 40 m. The principal capes are San Juan on the N. E., Mala Pascua on the S. E., Rojo on the S. W., and Bruquen on the N. W. The coasts are generally regular, but there are many bays and inlets, and the N. coast is lined with navigable lagoons. The principal ports are San Juan, Arecibo, Aguadilla, Mayaguez, Ponce, Guayanilla, Humacao, and Fajardo. A range of mountains extends through the island from E. to W., having a general height of about 1,500 ft. above the sea, with one peak in the N. E., Luquillo, whose summit is called Yunque, of 3,678 ft. From these mountains descend many small streams, some of which are navigable a few miles inland for small vessels. In the interior are extensive plains, and there are level tracts from 5 to 10 m. wide on the coast. The soil is exceedingly fertile. In the mountains it is a red clay, colored with peroxide of iron; in the valleys it is black and less compact, and on the coasts it is sandy, but capable of some culture. The pasture lands in the N. and E. parts are superior to any others in the West Indies. The climate, though very warm, is more healthful than that of the other Antilles. The prevailing winds are E. and E. N. E., but from November to March N. winds are frequent. The land wind, so constant at night in the other islands of the Antilles, is felt but seldom. The island has suffered much from hurricanes, of which those in 1742 and 1825 were very destructive. The natural productions are numerous and valuable. Many varieties of cabinet and dye woods, including mahogany, ebony, lignum vitæ, cedar, and logwood, and plants valuable in the arts and in pharmacy, abound. The tropical fruits grow to perfection. Among the agricultural products are sugar cane, coffee, tobacco, cotton, rice, and maize. The amount of sugar obtained from a given area is greater than in any other West India island. The poverty of the fauna and flora is remarkable, there being scarcely any wild animals, birds, or flowers. Gold, copper, iron, lead, and coal are found, but no mines are worked; considerable quantities of salt are procured from lakes. Agriculture is almost exclusively in the hands of the natives, but most of the business and commerce is controlled by foreigners and Spaniards from the Peninsula. The total value of the commerce in 1871 was about $33,000,000, of which $17,500,000 was for imports. The chief exports are sugar, molasses, coffee, tobacco, cotton, cacao, cattle, and hides. The total amount of sugar exported in 1871 was 111,084 tons, of which 1.732,897 cwt. was sent to the United States, 460,688 cwt. to Great

Britain, 5,374 cwt. to Spain and Cuba, and 9,088 cwt. to Germany. The export of coffee in the same year was 210,366 quintals, of tobacco 54,640 quintals, and of molasses 7,590,915 gallons. The entrances in 1871 were 1,919 vessels, of an aggregate of 327,941 tons, of which 544, of 81,966 tons, were British. Porto Rico is connected by a telegraphic cable with the other West India islands, and a land telegraph connects the principal towns. Several railways are projected, but none have been built. There is great need of better facilities for internal communication, as well as of drainage, sewerage, and water supply; but as the surplus revenue has been used of late years to continue the war in Cuba, few public improvements have been made.—Porto Rico is governed under a constitution voted by the Spanish cortes in 1869. The civil governor is president of the superior tribunals of justice and of the superior juntas of the capital; but the fiscal administration has a special chief called intendant. The supreme judicial power lies in a royal *audiencia*. Justice is administered in the cities and in the country by judges of the first instance and by alcaldes. There are nine special tribunals: civil, ecclesiastical, war, marine, artillery, engineers, administration, probate, and commerce. Ecclesiastical affairs are presided over by a bishop chosen by the crown and approved by the pope. For administrative purposes the island and its dependencies are divided into nine districts: Porto Rico, Bayamon, Arecibo, Aguadilla, Mayaguez, Ponce, Humacao, Guayama, and Viéques. The chief towns are San Juan de Puerto Rico, the capital, San German, Ponce, Mayaguez, Arecibo, Guayama, Aguadilla, Caguas, Bayamon, and Humacao.—Porto Rico was discovered by Columbus in 1493, and invaded in 1509 by the Spaniards under Ponce de Leon, who in a few years exterminated the natives, then 600,000 or 800,000 in number. Slavery was abolished in the island by the Spanish cortes in March, 1873.

PORTO SANTO, an island in the Atlantic ocean, 25 m. N. E. of Madeira, of which it is a dependency; pop. about 1,600, of whom 300 reside in the town of the same name. It is about 6 m. long and 2½ m. broad, and its surface is rugged and hilly, although not more than 500 ft. high in any part. It is probably of volcanic origin, and has a black and barren appearance, being entirely destitute of trees. An inferior kind of wine, maize, barley, and vegetables, and a few fruits, are its chief productions. Live stock and poultry are plentiful. The town of Porto Santo is at the foot of a fine bay, which is protected by a battery. Its harbor is good, though exposed to southerly winds, and is frequented by vessels passing to and from the cape of Good Hope. Porto Santo was discovered by the Portuguese in 1418. It was for some time the residence of Columbus, whose wife owned property there.

PORT ROYAL, the name of two Cistercian monasteries widely celebrated as the nurseries of Jansenism in France. The parent house, Port Royal des Champs, was situated at Chevreuse, near Versailles, and Port Royal de Paris was situated in the faubourg St. Jacques, where is at present the hospital of La Maternité. Port Royal des Champs was founded in 1204 by Matthieu de Montmorency, lord of Marli, and his wife, Mathilde de Garlande, on a fief called Porrois, and later Port du Roi, whence the name of Port Royal. The Bernardine or Cistercian nuns to whom it was given elected their own abbess, and were allowed in 1223 by Pope Honorius III. to receive into the community ladies wishing to find an asylum there without being bound by religious vows. The abbey became also a boarding school for the daughters of the nobility. It possessed great wealth, and had fallen away from its primitive austerity when in 1605 Marie Jacqueline Angélique Arnauld, known in history as Mère Marie Angélique de Ste. Madeleine, became abbess, and a few years afterward undertook a thorough reform of the sisterhood. Her success in this caused her to be sent to the monastery of Maubuisson, where she soon effected a similar change; and on returning to her former charge she was followed by 30 of the nuns of Maubuisson. Noble novices flocked in from every side, and the community began to look out for a new abode. A change was, moreover, rendered necessary by the marshy nature of the surrounding country. Mme. Catherine Arnauld, mother of the abbess, thereupon purchased the spacious hôtel de Clagny or Clugny in the faubourg St. Jacques, and on May 28, 1625, a portion of the community removed thither, the others following soon afterward. Mme. Arnauld had given another daughter, Agnès, while yet a child, to Port Royal, who governed the abbey while Mère Marie Angélique was reforming Maubuisson. In 1626 Mme. Arnauld herself and her remaining daughters became members of the Parisian community, together with five of her grandchildren, daughters of Robert Arnauld. In 1630 a rule was established that the abbess of Port Royal de Paris should be elected every three years, and from this time Mère Marie Angélique and Mère Agnès discharged the office alternately, the institution being meanwhile filled by women of the highest distinction. In 1633, the increase of the community having necessitated the erection of a new edifice adjoining the old hotel, the sisters removed thither.—The lands around Port Royal des Champs were meanwhile drained, the old abbey buildings were repaired, and a new construction was begun on a neighboring hill. About 1626 a community of pious and learned men took up their abode near the abbey in a farm house called Les Granges, and in 1627, after the departure of the last nuns, these gentlemen occupied the abbey buildings, which then passed under the immediate jurisdiction of the archbishop of Paris. Among the "recluses (*solitaires*) of Port Royal" were the grammarian Claude Lancelot; three nephews of Marie Angélique, Antoine Le Maistre, Simon Séricourt, and Isaac de Sacy, the translator of the Bible; two of her brothers, Robert, called Arnauld d'Andilly, and Antoine Arnauld, the latter known as the "great Arnauld;" Pierre Nicole, Lenain de Tillemont, and later Blaise Pascal and Nicolas Fontaine. Of these the greater number were either pupils or penitents of the celebrated Duvergier de Hauranne, commonly called the abbé de Saint Cyran. Both he and Jansenius were living together in Paris at the time that Mère Marie Angélique was busy in perfecting her reforms. She came at first under the influence of St. Francis of Sales, who encouraged her to persevere in restoring the purity of religious discipline, and was next attracted to Duvergier (afterward made abbot of Saint Cyran) by his ascetic life, and swayed by his inflexible temper. He acquired a like ascendancy over her father, Antoine Arnauld (died in 1619), and over his other children, all of whom with their mother became attached to Port Royal and adopted the opinions of Jansenius, or rather of Duvergier, who was the superior intellect and from whom the other had learned. The nuns in Paris, with their numerous and powerful connections, and the recluses at Chevreuse together with their scholars, and the noble or wealthy families to which these belonged, were thus leavened with the new doctrines, and became its apostles. The recluses of Port Royal were brought together by the same ascetic tendency, the desire of living up to a common ideal of Christian perfection, and of laboring to withstand the pervading social corruption by establishing thoroughly Christian schools and publishing the most powerful works in refutation of the prevailing errors. Both Duvergier and Jansenius considered the Jesuit colleges and the Jesuit theology as the bane of the church. Their followers of Port Royal, acting on this conviction, bent all their efforts toward organizing a system of education in every way antagonistic to that of the society of Jesus. These efforts had been crowned with no inconsiderable success, when the enormous increase of the community of Port Royal de Paris forced Mère Marie Angélique in 1647 to return to Port Royal des Champs with a large body of nuns. They took possession of the abbey, the recluses retiring to Les Granges with their scholars. The neighboring marshes were now drained, and the abode of Port Royal des Champs was as salubrious as it had been once unhealthy. The nuns opened a female seminary in the abbey, which was soon filled by the daughters of the nobility. At this period, too, Mère Marie Angélique and Mère Agnès began to receive powerful aid from their niece, Mère Angélique de St. Jean. From Les Granges proceeded those educational works, still unsurpassed in our day, the Port Royal Greek and Latin grammars, known as *Nouvelle méthode pour apprendre la langue grecque*, *Nouvelle méthode pour apprendre la langue latine*, *Jardin des racines grecques*, *Grammaire générale et raisonnée*, *Élémens de géométrie*, and *La logique, ou l'art de penser*. On these masterpieces labored conjointly Lancelot, Arnauld, Nicole, and De Sacy. Other important works on moral philosophy and theology were also produced, which have preserved their reputation even to the present day. Nor were the nuns without their share in these theological and literary contests. Mère Marie Angélique wrote the first history of the persecution suffered by the nuns; Mère Agnès is the author, among other works, of *L'Image de la religieuse parfaite et imparfaite;* and their niece Mère Angélique de St. Jean composed *Mémoires pour servir a l'histoire de Port-Royal.*—The labors of either sex were not confined to the class room, the cloister, or the study; they made of their domain at Chevreuse a model farm, and encouraged the peasants to improve their methods of tillage as well as their manners. During the civil wars of the Fronde and subsequent seasons of distress they displayed the most unbounded charity and hospitality toward the suffering populations. Port Royal became, in the words of a contemporary historian, "a Noah's ark amid the deluge of distress." Its walls protected the fleeing peasants from a lawless soldiery; its vast courts were more than once filled with the flocks of the fugitives; in the church were stored their grain and other movables; the sick and infirm were lodged in the outhouses, and the able-bodied lay down wherever they found room.—The mode of life in Port Royal was distinguished for austerity. The inmates rose at 3 o'clock in the morning, and after the common morning prayer kissed the ground, as a sign of their self-humiliation before God. Then they read, kneeling, a chapter from the Gospels and one from the Epistles, and concluded with another prayer. Two hours in the morning and two in the afternoon were devoted to manual labor in the gardens adjoining the convent, and they observed with great strictness the season of Lent. This period was also one of continual conflict with the Jesuits. The book of Jansenius entitled *Mars Gallicus*, published in Holland about 1634, was a violent attack on the French government and people, and led to the elevation of the author to the bishopric of Ypres. The warm friendship subsisting between him and Duvergier, and the avowed support given to the theological opinions of both at Port Royal, awakened the suspicions of Cardinal Richelieu, who in 1638 subjected Port Royal and Duvergier to a judicial inquiry, ending in Duvergier's imprisonment. The suspicions of the government were confirmed by the appearance in 1640 of Jansenius's most celebrated work, *Augustinus*, twice reprinted in France, in 1641 and 1643, and received with undisguised enthusiasm by the Port Royalists. Jansenism was thenceforward identified with the name of the abbey, and the government became its declared opponent. The war between Port Royal and the society of Jesus raged without intermission from that time. After the death of Richelieu (1642) Duvergier regained his liberty, but soon died (1643), prophesying that for the contest against the Jesuits he would leave 20 disciples stronger than himself. In the same year Dr. Antoine Arnauld, by his treatise *De la fréquente communion*, charging the Jesuits with admitting people of the world without due preparation to the Lord's supper, first formally impeached the moral teaching of the society. Its members in France were supported by the government, as well as by the majority in the Sorbonne, while Port Royal was supported by the parliament and not a few illustrious personages, among whom was the duchess de Longueville, who established herself in the vicinity of the convent. The recluses remained the leaders and the centre of the opposition to the papal efforts for the suppression of Jansenism, and the nuns persistently refused to subscribe to the condemnatory decrees, except once, in 1668, when their friends had secured a kind of compromise. Singularly enough, it was the bold defence of the rights of the popes on the part of two Jansenist bishops against the despotic caprices of Louis XIV. which led to the scattering of the community, the heads of whom, Arnauld and Nicole, had to flee from France. In 1664 the nuns of Port Royal de Paris were dispersed by the military, some of them being confined in various convents of the capital, and the others taken under escort to Port Royal des Champs, and kept prisoners there till 1669. Throughout all this period of trial the inhabitants of the surrounding country remained devotedly attached to their benefactors. In 1669 the two convents were made independent of each other, the king reserving to himself the right of nominating the abbess of the Parisian house, which numbered only ten nuns and received one third of the common property. Port Royal des Champs, with 80 nuns, retained the other two thirds with the faculty of electing its superior. The former community, composed only of such as had subscribed the formulas condemnatory of Jansenism, were allowed to recruit their numbers as before, and became the decided opponents of their sisters at Chevreuse. These were forbidden to receive novices, and Port Royal des Champs was suppressed by a bull of Pope Clement XI. in 1708, its property was transferred to the sisterhood of Paris, the inmates were dispersed in various convents, and the buildings were levelled to the ground (1709). But the teaching of Port Royal had obtained too many adherents among the governing classes in church and state, to be extinguished by decrees or overthrown by the hand of the leveller. It lived on in France, Holland, Germany, in the north of Italy and the kingdom of Naples, in Spain, and particularly in Portugal, till, in connection with the Old Catholic movement, the disciples of Jansenius and Duvergier de Hauranne have again become conspicuous since 1870. In 1711 the bodies of Le Maistre, Arnauld, Pascal, and Racine, which reposed in the monastery church, were exhumed and transported to Paris. The Parisian community was suppressed in 1790; the establishment received then the name of Port Libre, was converted into a hospital in 1795, and in 1814 became the lying-in asylum of La Maternité. Among the illustrious pupils of the school of Port Royal were the poet Racine, the brothers Bignon, and Achille de Harlay. Boileau, though not a pupil, was one of its firmest supporters.—The best histories of this establishment are: Fontaine, *Mémoires pour servir à l'histoire de Port-Royal* (2 vols., Cologne, 1736); Racine, *Histoire abrégée de Port-Royal* (Paris, 1742); Besoigne, *Histoire de Port-Royal* (6 vols., 1752); Dom Clément, *Histoire de Port-Royal* (10 vols., 1755–'7); Grégoire, *Les ruines de Port-Royal* (1801); Reuchlin, *Geschichte von Port-Royal* (2 vols., Hamburg, 1839–'44); Sainte-Beuve, *Port-Royal* (5 vols., Paris, 1840–'60; 3d ed., 6 vols., 1867); and Beard, "Port Royal, a Contribution to the History of Religion and Literature in France" (2 vols., London, 1861).

PORT SAID, a town of Egypt, at the junction of the Suez canal with the Mediterranean; pop. in 1871, 8,859, about half Europeans. The principal street is called La Cannebière, and the main square the place Lesseps. It contains a Catholic and a Greek church, several schools, and a hospital. Originally an insignificant village, it has grown up since the beginning of the Suez canal in 1859. The population was at one time 14,000, but has declined since its completion in 1869. Two large jetties protect the outer harbor, which is connected by a canal with the inner harbor on Lake Menzaleh; the latter contains vast dockyards. About 1,000 ships, chiefly steamers, enter the port annually.

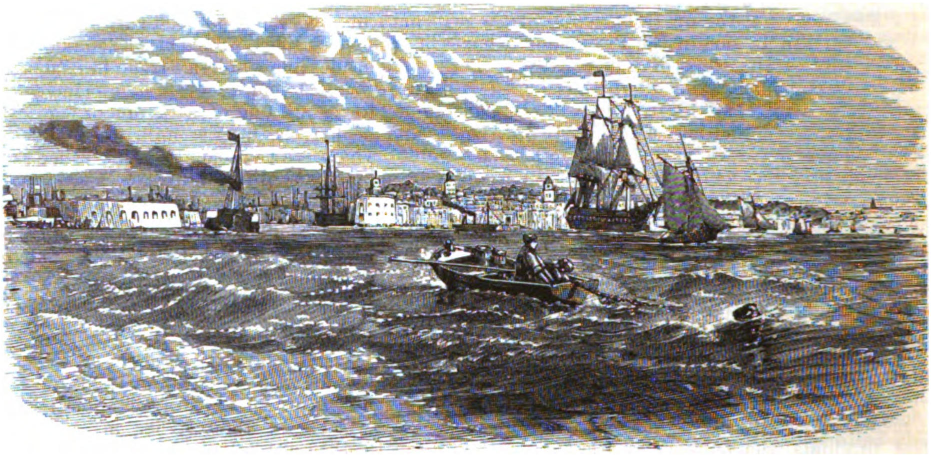
PORTSMOUTH, a city, port of entry, and one of the capitals of Rockingham co., New Hampshire, the only seaport in the state, situated on the S. side of the Piscataqua river, 3 m. from the sea and 54 m. N. by E. of Boston; lat. 43° 5′ N., lon. 70° 46′ W.; pop. in 1850, 9,738; in 1860, 9,335; in 1870, 9,211. It stands on a beautiful peninsula, formed by the Piscataqua. Its quietness and quaintness, and the pleasant drives and fine beaches in the vicinity, render it a favorite summer resort. It is supplied with water from a distance of 3 m. by works constructed by a company formed in 1799, and has a good fire department. It has railroad communication with Boston, Portland, and the principal points in the state, by means of the Eastern, the Portsmouth, Great Falls, and Conway, the Portsmouth and Dover, and the Concord and Portsmouth lines. The harbor can accommodate 2,000 vessels, is particularly safe, and has sufficient depth at low water for the largest class of ships. It is much frequented as a port of refuge, and the rise of the tide and strength of the current keep it always free from ice. The principal entrance is between the mainland and the E. side of Great island, and is defended by Fort McCleary on the former, and Fort Constitution on the N. W. point of the latter. The United States navy yard is on Continental or Navy island, on the E. side of the Piscataqua, within the limits of the town of Kittery, Me. It has extensive ship houses, one of which is 300 ft. long, 131 ft. wide, and 72 ft. high; large sheds for timber, a rigging loft, machine shop, &c. The balance dry dock is 350 ft. long by 105 ft. broad, and has 24 pumps worked by two steam engines. The value of the foreign commerce of the district for the year ending June 30, 1874, was $41,568, almost entirely imports. The number of entrances was 54, tonnage 9,794; clearances 62, tonnage 9,369. The number of vessels belonging in the district was 74, tonnage 14,502. The manufactures are of considerable extent, and include cotton fabrics (Kearsarge mills, with 26,000 spindles), hosiery, ale and beer, boots and shoes, carriages, medicinal cod-liver oil, copper and brass foundery products, sleighs, soap, leather, &c. Ship building is also carried on. There are four national banks, with an aggregate capital of $950,000; a trust and guarantee company, with a capital of $200,000; and two savings banks, with deposits to the amount of $2,750,000. Sessions of the United States courts for the district of New Hampshire are held here. The public schools comprise separate high schools for boys and girls and 18 grammar and primary schools, of which part are graded and part ungraded. There are also a commercial college and a young ladies' seminary. The Portsmouth Athenæum, with a fine three-story brick building, has a reading room, a library of more than 11,000 volumes, and cabinets of minerals and natural history. The mercantile library association has 2,000 volumes. Two daily and three weekly newspapers are published. There are 10 churches, viz.: Baptist, Christian, Congregational, Episcopal, Freewill Baptist, Methodist, Roman Catholic, Second Advent, Unitarian, and Universalist.—Portsmouth was settled in 1623, incorporated as a town in 1633, and as a city in 1849. It was the capital of the colony and state till 1807, except during the revolution, when the seat of government was at Exeter.

PORTSMOUTH, a city, port of entry, and the county seat of Norfolk co., Virginia, on the W. bank of Elizabeth river, opposite the city of Norfolk, with which it is connected by ferry, and at the terminus of the Seaboard and Roanoke railroad; pop. in 1850, 8,122; in 1860, 9,496; in 1870, 10,492; in 1875, 13,598, of whom 4,120 were colored. It is on level ground and is regularly laid out. The harbor is one of the best on the Atlantic coast, and is accessible by the largest vessels. Gosport at the S. extremity of the city is the seat of a United States navy yard, dry dock, and naval hospital. Lines of steamers run to Boston, Providence, New York, Philadelphia, Baltimore, Washington, Richmond, and other points. The principal shipments in 1874 were 242,551 bales of cotton, 9,968,400 ft. of lumber, 2,180,000 oak staves, 57,253 barrels of naval stores, 13,869 tons of pig iron, and about 300,000 barrels and boxes of early vegetables, valued at $1,250,000. There is a considerable wholesale trade in coal, fertilizers, groceries, and liquors. The principal manufactories are one of cars, one of carriages, one of barrels, a grist mill, and two saw mills. There are two banks, an insurance and banking company, three hotels, two academies, 12 public and 41 private schools, a daily newspaper, and 13 churches, viz.: 4 Baptist, 2, Episcopal, 5 Methodist, 1 Presbyterian, and 1 Roman Catholic.

PORTSMOUTH, a city and the capital of Scioto co., Ohio, on the Ohio river, just above the mouth of the Scioto, at the terminus of the Ohio and Erie canal and of a branch of the Marietta and Cincinnati railroad, 80 m. S. of Columbus, and 85 m. E. S. E. of Cincinnati; pop. in 1850, 4,011; in 1860, 6,268; in 1870, 10,592; in 1874, 13,034. It is built on a plain of moderate extent, partly enclosed by hills, is lighted with gas, and has Holly water works, an opera house, masonic temple, and two odd fellows' halls. It is the entrepot of the rich mineral regions of southern Ohio and northeastern Kentucky, and the numerous iron furnaces are supplied by its trade. The Scioto valley is a productive agricultural district. Two projected railroads are expected largely to increase the importance of the city, the Portsmouth and Pound Gap, extending to Port Royal, S. C., and the Scioto Valley line. Portsmouth contains two rolling mills, three founderies, a manufactory of agricultural implements, a hub factory, two planing mills, a saw mill, two freestone saw mills, three large furniture factories, four breweries, a distillery, three flouring mills, &c. There are five national banks, a savings bank, seven building associations, graded public schools, three weekly (one German) newspapers, and Baptist, Christian, Episcopal, Methodist, Presbyterian, Roman Catholic, and other churches.

PORTSMOUTH, a fortified port of Hampshire, England, on the S. W. extremity of the island of Portsea, 68 m. S. W. of London; pop. in 1871, 113,569. It consists of two towns, Portsmouth proper and Portsea, separated from each other by a small creek or arm of the sea, but united in one complete fortress. The number of places of worship in 1872 was 56, of which 19 belonged to the church of England. One of them was originally erected early in the 18th century, and dedicated to St. Thomas à Becket, but the chancel is the only part left of the ancient building. A force of 13,000 men would be necessary to man the fortifications, but the usual garrison consists of about 2,500. The chief importance of the place is derived from the royal dockyard, which is at Portsea, N. of

Portsmouth proper, and covers 120 acres, enclosed by walls. On the mainland opposite is the town of Gosport, with a population in 1871 of 7,366. The channel between these two places forms the entrance to Portsmouth harbor, here defended by South Sea castle on the east, and Moncton fort on the west, and extending several miles between the island of Portsea and the mainland, and gradually widening till it attains a breadth of about 3 m. at its N. extremity. The depth of water is sufficient for vessels of the largest class, and the harbor opens into the roadstead of Spithead sheltered by the isle of Wight. The imports of foreign and colonial merchandise at the port in 1872 were valued at £282,041, the exports at £15,670. The number of vessels entering the port in 1871 was 418, tonnage 38,600; cleared 370, tonnage 31,064.—The earliest notice of Portsmouth (in 501) occurs in the "Saxon Chronicle," where it is called Portsmuthe. During the reign of Alfred a fleet of nine ships was fitted out at the port, which defeated the Danes; and before the Norman conquest a large number of vessels were sent from it to intercept the invaders. The French landed and burned a great part of the town in 1377, but were ultimately defeated with heavy loss. After this disaster the fortifications were extended and improved, and have continued to receive additions up to the present time.



Portsmouth.

PORTUGAL (from *Portus Cale*, the ancient name of the town of Oporto; anc. *Lusitania*), a kingdom of Europe, occupying most of the W. portion of the Iberian peninsula. It is bounded N. and E. by Spain, and S. and W. by the Atlantic, and extends from lat. 36° 57′ to 42° 8′ N., and from lon. 6° 12′ to 9° 32′ W. Its greatest length from N. to S. is 366 m.; greatest breadth from E. to W. 137 m., general breadth about 100 m. The length of the coast line is about 500 m., of which 100 m. is on the south. The extreme S. W. point of Europe is formed by the elevated cliffs of Cape St. Vincent, whence the shores decline by a gentle slope, which on the north terminates in the low and flat region surrounding the laguna of Setubal, and on the southeast ends near Cape Santa Maria, the most southerly point of the kingdom. This latter part of the coast is fringed by numerous islands, of one of which the cape just mentioned forms a part. N. W. of the laguna of Setubal rises the Serra da Arrabida, which, from an elevation of less than 2,000 ft., gradually sinks to less than 700 ft. at Cape Espichel, where it terminates. Thence northward to the mouth of the Tagus the coast is generally low, but N. and W. of Lisbon the space between the river and the Atlantic is occupied by the mountain ranges of Torres Vedras, Mafra, and Cintra, which terminate W. of Lisbon in the Cabo da Roca, the most westerly promontory of the continent, nearly 2,000 ft. high. N. of this to the mouth of the Mondego the coast is generally rugged, though low, but from the Mondego to the Douro it is flat and sometimes swampy. N. of Oporto is another rise in the coast, which again subsides on approaching the Minho. The only islands of the W. coast are the Berlingas, 10 m. N. W. of the Peniche peninsula. The harbors are comparatively few, the principal being Lisbon, Oporto, Setubal, Aveiro, Figueira, and Viana, and nearly all have bars which render them inaccessible with westerly and southerly winds, on account of the terrible surf.—The surface of Portugal may be considered as a continuation of that of Spain, from which it is not divided by natural boundaries. Spurs of the Pyrenees enter the provinces of Tras os Montes and Minho from the Spanish province of Galicia. One of them, the Serra de Acoba, extends into Beira, and terminates in a low coast chain, the extreme S. W. point of which is Cape Mondego. A much more extensive mountain system almost bisects the kingdom from N. E. to S. W., traversing the provinces of Beira and Estremadura, in the former of which it is called Serra da Estrella, and in the latter successively takes the names of Serra do Aire, Patelo, Albardos, and Junto. The extreme S. W. spurs of this great range comprise the mountains of Torres Vedras, Mafra, and Cintra. The highest peaks of the Estrella range reach an altitude of about 6,500 ft. Other ridges traverse the country obliquely in the same direction as the former, such as the Serra do Moradal, S. of that of Estrella in Beira, and the Serra d'Ossa in Alemtejo, which in the E. corner of that province unites with the Portalegre chain almost at right angles. The southern branch of the latter is called the Serra de Viana. The remarkable Serra de Monchique, the eastern ramification of which is called Serra de Caldeirão and the western Serra Figueira, runs nearly parallel to the S. coast, and forms a natural barrier between Algarve and the remainder of the kingdom. It terminates in the rocky precipice of Cape St. Vincent, and like all the Portuguese mountains is but the western ramification of a great Spanish system. All the mountain scenery is fine, but that of the beautiful region around Cintra is unequalled elsewhere.—The most important rivers are the Tagus (Tejo), Douro, Guadiana, Minho, and Lima, all entering the kingdom from Spain, and the Sadão, Mondego, and Cavado, entirely within Portuguese territory, the largest of which is the Mondego. The Tagus separates the provinces of Beira and Alemtejo, traverses Estremadura, and reaches the ocean through a vast estuary resembling rather an arm of the sea than a river, in which is the commodious harbor of Lisbon. It is navigable to Abrantes, upward of 80 m. inland. The Minho, forming the boundary line with the Spanish province of Pontevedra, likewise expands into a fine estuary through which it falls into the sea. The Douro, after a S. W. course of nearly 60 m. between the two kingdoms, traverses Portugal, and empties through a wide mouth below Oporto. The Guadiana crosses the frontier a short distance W. of Badajoz, forms the boundary line with the province of Badajoz for about 40 m., and then flows entirely within Alemtejo generally S. to the N. E. corner of Algarve, from which point S. it serves as the dividing line with Spain to its mouth at the extreme S. E. point of Portugal. There are several smaller rivers, none of which are navigable, and a few unimportant lakes. Mineral and hot springs are abundant; but the scarcity of water in many districts, particularly in Alemtejo, renders large tracts uninhabitable. In the vicinity of Setubal and near Aveiro are several salt marshes.—Granite constitutes the great geological base, which is generally overlaid by clay slates and micaceous schists, forming the upper strata of several provinces. The district of the upper Douro is formed of slate rocks belonging to the Silurian system, and nearly surrounded by granitic and syenitic mountains. In this district, about 11 m. from Oporto, is the anthracite coal field of Vallongo. Limestone abounds on the declivities of the Serras Junto, Arrabida, Monchique, and Calderão. S. of Abrantes is a tertiary basin with an area of more than 2,000 sq. m., in which Lisbon stands. S. of this secondary beds appear, and still further S., between Alemtejo and Algarve, is a lofty chain of hills consisting of schist and slate. The mineral products are considerable, though few mines are worked. The lead mine of Braçal, not far from the river Vouga, gives occupation to a large number of persons. Gold and silver are found in small quantities. The salt pits yield about 60,000,000 bushels annually.—The climate is on the whole cooler than that of Spain, the summer heat being tempered all along the coast lands by delightful sea breezes. The mean annual temperature at Coimbra is 62° F., and at Lisbon 61°. In the northern mountainous parts snow sometimes falls heavily; in the south it is almost unknown. Abundant rains visit the W. coast in winter, but violent storms are rare.—The soil is rich and the scenery beautiful. In addition to the oak, chestnut, pine, elm, and ash, there are the cork tree, olive, walnut, mulberry, orange, lemon, citron, fig, peach, apricot, almond, and arbutus. The camellia japonica, acacia, mimosa, and tulip abound. Humboldt estimates the different species of indigenous plants as exceeding 3,200. A few wild animals are still found, such as the wolf, the wild cat, and the wild boar. Small game and edible fish are abundant.—Portugal is divided into six provinces, which, with their areas, population (estimate of 1871 from the census of 1868), and capitals, are as follows:

PROVINCES.	Area, sq. m.	Population, 1871.	Capitals.
Minho	2,807	971,001	Oporto.
Tras os Montes	4,289	365,888	Bragança.
Beira	9,244	1,294,282	Coimbra.
Estremadura	6,872	889,691	Lisbon
Alemtejo	9,416	381,841	Evora.
Algarve	1,872	188,422	Faro.
Total	34,500	3,990,570	

The provinces are subdivided into 17 districts, and these into 111 comarcas and 3,774 parishes. Lisbon, the capital of the kingdom, has a population of about 225,000; the other important towns are Oporto, Coimbra, Elvas, Braga, Setubal, Evora, and Ovar, only one of which, Oporto, has over 50,000 inhabitants. The Azores or Western Isles (area, according to latest calculations, 996 sq. m., pop. about 250,000) and the islands of Madeira and Porto Santo (area 317 sq. m., pop. about 118,000) are administratively regarded as forming a part of the kingdom. The other colonial possessions of Portugal, with their areas and population (according to the latest estimates), are as follows:

	COLONIES.	Area, sq. m.	Population.
In Africa.	Cape Verd islands	1,649	70,164
	São Thomé and Principe islands	454	23,681
	Bissao, &c., in Senegambia	26	8,500
	Ajuda	18	700
	Angola and Ambriz Benguela and Mossamedes	250,000	2,000,000
	Mozambique, Sofala, &c.	380,000	300,000
In Asia.	Goa, Salsette, Bardez, &c.	1,447	474,234
	Damaun	155	40,980
	Diu (island)	2¼	12,808
	Timor and Solor	5,527	250,000
	Macao (in China)	12	71,739
	Total	689,285¼	3,258,140

—The people of Portugal resemble in appearance and manners the natives of Galicia in Spain, but differ considerably from those of Castile and Leon. On the whole the comparison is unfavorable to the Portuguese lower classes, who are ignorant and indolent. Yet in the mountainous districts, such as Tras os Montes, the peasantry are active and energetic, and are peculiarly fitted for the army. The educated classes are polished in manners, courteous to strangers, insinuating, and altogether more pleasing than the corresponding classes in Spain. The women are retired, domestic, and amiable.—Agriculture is still in a backward condition. The farmers are ignorant, and with few exceptions raise the same crops on the same soil from year to year, without rotation. Improvements in cultivation were impeded by most of the land being owned either by the crown, the nobility, or the clergy. With amended mortmain laws the soil has become free, and agricultural progress rendered possible; and improved methods and implements are gradually introduced, especially in Alemtejo. Maize is the principal crop in the northern districts of Viana, Braga, Oporto, Aveiro, Vizeu, and Coimbra. The central districts of Leiria, Santarem, and Lisbon, extending from the valley of the Mondego to the southern limit of that of the Tagus, produce as much wheat and maize and more rice than all the rest of the kingdom. The provinces of Alemtejo and Algarve are the hottest and dryest part of Portugal, and abound with herds of swine. The mountainous districts of Castello Branco, Guarda, Bragança, and Villa Real produce good rye and maize, and the hills and valleys afford excellent pasturage in spring. In 1874 the production of wheat was about 5,500,000 bushels, rye 5,900,000, maize 14,000,000, and rice 400,000. The cultivation of rice, introduced in the middle of the last century, is retarded by the insalubrious influences popularly supposed to attend its cultivation. The cultivation of the vine constitutes one of the most important commercial elements of the country; the vineyards cover an area of 473,517 acres, yielding annually 132,500,000 gallons of wine. The most important wine-producing region is that of the Douro watershed, which produces the famous Oporto wines; its vineyards cover 77,205 acres, and yield an annual average of 1,325,000 gallons. (See PORTUGAL, WINES OF.) The exports of wine have increased from 4,715,386 gallons in 1842 to 6,366,837 in 1861, and 8,069,276 in 1870. In 1873 the exports from Lisbon alone amounted to 3,834,106 gallons. Of a great variety of indigenous fruits, the principal is the orange, with a mean annual yield of 626,000,000. Lemons and figs form a leading source of agricultural wealth; the average annual yield of lemons is 20,405,000. The olive is cultivated over an area of more than 100,000 acres, principally in Alemtejo, Estremadura, and Tras os Montes. The manufacture of oil is one of the most important branches of industry in Portugal, and likewise one of the most progressive; the quantity annually produced averages 5,412,000 gallons. The state forests cover 51,782 acres, and those owned by the municipalities and private individuals may be set down at 250,000 acres.—The foreign trade of Portugal is mostly with Great Britain, Brazil, and France; and the chief articles of export are wines, olive oil, oranges and lemons, iron and copper pyrites, cork, elephants' teeth, wool, archil (a colonial product), cotton fabrics, vinegar, silver in bars and worked, other metals, chemicals, salt, dried fruit, and pork. The imports mainly comprise cotton, woollen, and silk fabrics, gold and silver coin and jewelry, rice, butter, sugar, salt fish, tobacco, coal, iron wrought and unwrought, timber, cotton, tea, coffee, hides, and drugs. The foreign commerce has steadily increased since 1852; the annual value of the imports increased from $10,214,625 in that year to $29,876,000 in 1871; and the exports in the same period from $7,231,586 to $23,386,000. Wine constitutes more than one third of the value of the entire exports. The Portuguese merchant navy in 1873 consisted of 17 steamers with an aggregate tonnage of 14,536, and 415 sailing vessels, with an aggregate of 93,815 tons.—Much of the present agricultural prosperity of the country is due to the improved condition of the highways. In 1873 there were 1,824 m. of national highways, 356 m. of district roads, and 76 m. of communal roads, besides 204 m. in process of building. These roads have cost the treasury about $10,000,000. Important works have likewise been undertaken of late years for improving the beds of the larger rivers, and for the canalization of the smaller streams. The length of the railway lines completed in October, 1873, was 503 m., including that from Lisbon to the Spanish frontier, 182 m., and that to Oporto and Coimbra, 144 m. Subsidies to the amount of $18,000,000 have been paid by the national treasury for the building of these lines, several branches of which are now (1875) in course of construction. In 1873 there were 1,930 m. of telegraph wires.—The manufactures are still comparatively unimportant, though considerable progress has been made within a few years, particularly in Lisbon, where several prosperous establishments have been founded, though chiefly under the direction of foreigners. Manufactories of cotton, wool, silk, paper, chemicals, earthenware, and candles are among the more important establishments formed since 1860. There are likewise saw mills and rope factories; and porcelain, lace, copper and tin ware, ribbons, embroidery, hats, fine soaps, glass, and wickerwork are extensively manufactured. Ship building is carried on with some success at Lisbon and in other ports. Tobacco manufacture is a government monopoly, and is exclusively confined to Lisbon. In 1856 there were but two banks in all Portugal; in 1873 their number had increased to 15.—The government of Portugal is a constitutional monarchy, hereditary in the female as well as the male line. The constitution is based upon the *Carta de ley* granted by Dom Pedro IV. in 1826, and revised by the cortes in 1832. An additional act was made under date of July 5, 1852. The legislative power is vested in a cortes consisting of two houses, one of peers and the other of deputies; the peers are named for life by the crown, and the deputies are chosen by electors, who must have a yearly income of not less than $100. The administration is conducted by seven ministers, who form the cabinet. For judicial purposes Portugal is divided into 105 districts, in each of which there is a judge, from whose decision there is an appeal to superior courts at Lisbon and Oporto. These judges remain but six years at one place, and are appointed by the crown. Beneath them are inferior classes of judges, who are elected by the people for two years. Trial by jury is established in criminal cases, and also in civil unless the parties agree to a trial by the judge exclusively. The finances of the kingdom are confused, and there has been no budget for the past 30 years without a deficit.—The revenue for 1871-'2 amounted to $20,310,832, as follows: from direct taxation, $7,588,732; indirect taxation and customs, $10,600,612; deductions from civil list and salaries, $591,140; national domains, and miscellaneous, $1,530,348. The total expenditures were $24,015,605, distributed as follows: ministry of finance, $3,843,414; of interior, $2,018,181; of justice and religion, $635,034; of war, $3,751,199; of marine and the colonies, $1,248,519; of foreign affairs, $274,972; of commerce and public works, $1,404,062; interest on home debt, $4,810,969; interest on foreign debt, $4,731,505; expenditures extraordinary, $1,297,750. The national debt originated in 1796, when a loan of $4,500,000 was contracted; on Nov. 30, 1873, it amounted to $364,165,000, with an annual interest of $11,080,000. Nearly half of these amounts represents the foreign debt, mainly to Great Britain. The loan contracted in 1832 by Dom Miguel, and other portions of the national debt, have from time to time been repudiated, and the interest on the aggregate debt has not unfrequently remained unpaid; and sometimes, when the interest on the home debt has been paid, that on the foreign debt has not. By royal decree of Dec. 18, 1852, the interest on the whole national debt was reduced to 3 per cent., the creditors protesting in vain.—The army on Jan. 31, 1874, consisted of 24,544 infantry (officers and men), 4,242 cavalry, 2,797 artillery, and 666 engineers, besides 1,767 municipal guards. The colonial troops amounted to 7,847. The navy in 1874 comprised 23 steamers with an aggregate of 109 guns, and 16 sailing vessels with 44 guns. It was officered by a vice admiral, 5 rear admirals, and 38 captains, and manned by about 3,000 sailors and marines.—The Roman Catholic is the religion of the state, but all sects enjoy perfect freedom of worship. The ecclesiastical hierarchy includes the patriarch of Lisbon, who is always a cardinal, and to a certain extent independent of the pontifical see of Rome, the two archbishops of Evora and Braga, and 16 bishops, two of whom are for Madeira and the Azores. The patriarch's authority over the bishops is little inferior to that of the pope; but the bishops are appointed by the crown and confirmed by the holy see. All the conventual establishments of Portugal (632 monasteries and 118 nunneries, with over 18,000 monks and nuns, and an income of about $5,000,000 yearly) were suppressed by decree of May 28, 1834, and their property confiscated. A few religious establishments still exist, but the inmates are in extreme poverty. There are Protestant churches at Lisbon and Oporto; but the Protestants, who are for the most part foreigners, are said not to number over 500.—By a decree of Sept. 20, 1844, the primary schools are divided into elementary and higher. Primary instruction is compulsory, but the law is rarely enforced. In 1870 there were 1,950 male schools, with 104,000 pupils, and 350 female schools, with 28,000 pupils. Higher instruction is given in the lyceums, of which there is one in each district. Lisbon and Oporto have each a school of medicine and a polytechnic school. The university of Coimbra is the highest educational establishment in the kingdom. There is a royal academy of sciences, founded in 1778, and the *gremio litterario* in Lisbon.—Portugal was anciently inhabited by Celtic tribes, and was early visited for commercial purposes by the Phœnicians, Carthaginians, and Greeks. The Romans, who called it Lusitania from its chief tribe the Lusitani (see LUSITANIA), effected its subjugation about 140 B. C., and held it as a province till the 5th century of the Christian era, when it was overrun by the Visigoths and other northern barbarians. Early in the 8th century it was conquered by the Arabs or Moors, from whom it was partly recovered toward the close of the 11th century by Alfonso VI., king of Leon and Castile. About 1095 Alfonso gave the country between the Minho and the Douro to his son-in-law Henry of Burgundy, who took the title of count of Portugal or Porto Cale, the name then given to the united provinces of Minho, Tras os Montes, and a part of Beira. Henry, who made Guimaraens his capital, soon extended his dominions by conquests from the Arabs. He died in 1112, and was succeeded by his son Alfonso (Affonso) Henriquez, who in 1139 defeated the Moors in a great battle on the plains of Ourique near the Tagus. From this battle the Portuguese date the foundation of their kingdom. Dom Alfonso, having been proclaimed king by his army on the field of victory, was confirmed in that title by the pope, and acknowledged as independent by the king of Castile. In 1143 he assembled a diet at Lamego, which drew up the fundamental statutes of the kingdom. His son and successor, Sancho I., was equally successful in the struggle with the Moors, and by his valor and abilities raised Portugal to a high pitch of prosperity and power, extended its area to its present dimensions, and transferred the seat of government from Guimaraens to Coimbra. In 1197 he assumed the additional title of king of Algarve, though that territory was not fully conquered till 1253. Of his successors the most distinguished were: Dionysius (Diniz) I. (1279–1325), who built upward of 40 cities, encouraged industry and learning, opened an era of navigation and commercial enterprise, and died with the name of "father of his country;" and John (João) I., surnamed the Great (1385-1433). The latter repelled a formidable invasion of the Castilians, led a successful expedition against the Moors of Barbary, and acquired possession of Madeira and the Azores, which were discovered during his reign. The Portuguese at this period were the most enlightened and enterprising people of Europe, and their efforts to enlarge the scope of geographical knowledge toward the south led them to undertake daring and difficult voyages along the coast of Africa, which for nearly half a century were ably and perseveringly directed by Prince Henry the Navigator, son of John the Great. These attempts were at length crowned with success by the achievement of a passage to the East Indies round the cape of Good Hope by Vasco da Gama in 1497. This was in the reign of Emanuel the Fortunate (1495–1521), under whose intelligent guidance, though his reign opened with the expulsion of the Jews, prodigious efforts were made to extend the commerce and the dominion of Portugal in Africa and the East. In the latter region their power was exercised by a succession of able viceroys, among whom Alfonso d'Albuquerque was particularly eminent. For nearly a century the Portuguese were masters of the Indian ocean, and the dominant power on the E. coast of Africa and the S. coast of Asia. Gaspar Cortereal visited Newfoundland and the shores of Labrador and the St. Lawrence; and Cabral in 1500 discovered Brazil, which was shortly after taken possession of by Amerigo Vespucci, a Florentine in the Portuguese service, and was colonized by John III. (1521–'57). His grandson, Dom Sebastian (1557–'78), distinguished himself by Quixotic expeditions against the Moors of Barbary, in one of which, in 1578, he perished with all his army. This disaster effectually broke the power of Portugal. Dom Henry, the uncle of Sebastian, ascended the vacant throne, and on his death in 1580 without direct heirs, the crown was claimed by Philip II. of Spain, the prince of Parma, and the duchess of Bragança. The power of Philip decided the contest in his favor, and for the next 60 years Portugal was ruled by the kings of Spain, still designated as "the intruders" by the Portuguese. For a considerable period the peace of the country was disturbed by pretenders claiming to be Dom Sebastian, who was popularly believed to have escaped the swords of the Moors and to be still living in a mysterious seclusion from which he was to reappear for the redemption of Portugal. The rule of the Spanish kings bore heavily on Portugal, and in 1640 the nation rose in revolt, and by an almost unanimous vote proclaimed the duke of Bragança king, under the title of John IV. A long war with Spain ensued, which was terminated in 1665 by the decisive defeat of the Spaniards in the battle of Montesclaros. A treaty of alliance concluded with England in 1661 inaugurated a series of similar alliances destined to have great influence on the prosperity of Portugal. By this treaty the contemptible Alfonso VI. (1656–'83) gave to the English Tangiers and Bombay as the dowry of his daughter, the wife of Charles II. Alfonso VI. was set aside as imbecile in 1667, and replaced by his brother as regent, afterward King Pedro II. (1683–1706). Another alliance offensive and defensive was concluded with England in 1703, which drew Portugal into the war of the Spanish succession, and crippled its industry by the exclusive commercial privileges it conferred upon the English. Under John V. (1706–'50) an amicable adjustment was finally made with Spain in 1737, which had till then maintained its claim to Portugal. In the reign of Joseph (José, 1750–'77) Portugal experienced many calamities, the most remarkable of which was the great earthquake which destroyed half of Lisbon in 1755. This reign, however, was marked by great social and agricultural reforms, carried out chiefly by the genius and energy of the king's prime minister, the famous marquis of Pombal. The expulsion of the Jesuits from all Portuguese dominions was one of his most important acts. Still, though Pombal in the first years of his administration endeavored to destroy the commercial monopoly enjoyed by the English in Portugal, he left her at its close controlled more completely than ever by English interests. Joseph was succeeded by his daughter Maria (1777–1816), who reigned conjointly with her uncle and husband Pedro III. till his death in 1786. In 1792 she showed symptoms of insanity, and her son John, prince of Brazil, governed in her name, assuming the title of regent in 1799. In 1793 he was induced by England to declare war against the French republic, but the dreadful commercial distress and general bankruptcy caused by this step led to a peace in 1797. In 1799 the regent was persuaded by England to join her and Russia in a second war against France, which impoverished and weakened Portugal still more. Spain united her arms with those of France in 1801, and by the subsequent treaty of Badajoz Portugal was forced to cede Olivença to Spain, besides paying a considerable sum of money. From that moment Portugal became almost entirely dependent on England. She was invaded by the French under Marshal Junot in November, 1807, the regent with the royal family embarking for Brazil just as Junot appeared before Lisbon, where he declared in his master's name that the house of Bragança had ceased to reign. In the beginning of 1808 the Portuguese rose against the invaders, and, though several times defeated, kept the field till the arrival of the English under Sir Arthur Wellesley (afterward duke of Wellington), and with them gained the victory of Vimeiro, Aug. 21, followed by the convention of Cintra, Aug. 30, and the evacuation of Portugal by the French. The country, unaccustomed to self-reliance, was utterly helpless when overrun again by the French in 1809, and again protected by the English arms till 1812. The Portuguese court and government were meantime established in Rio de Janeiro. In 1815 Brazil was raised to the rank of a kingdom, and in 1816 Maria died and the regent became John VI., king of Portugal and Brazil. In 1820 the dissatisfaction of the Portuguese at the absence of the court, and a general feeling that fundamental changes were required in the constitution, led to a revolution unattended by violence or bloodshed, the army and the people acting in concert. A liberal constitution was adopted, and in 1821, at the request of the nation, John VI. returned from Brazil, leaving his eldest son Dom Pedro there as regent. John was forced, before being allowed to land at Lisbon, to accede to certain restrictions of the royal prerogative, and to swear fidelity to the new constitution. This secured freedom of person and property, liberty of the press, equality of all citizens before the law, the abolition of privileges, the eligibility of all Portuguese to offices, and the sovereignty of the nation. In the following year Dom Pedro was proclaimed emperor of Brazil, and the two countries were finally separated. John VI. died in 1826, and Dom Pedro of Brazil, his successor, surrendered Portugal to his daughter Maria da Gloria, and established a new and tolerably liberal constitution for the kingdom. Before Maria arrived in Portugal, however, her uncle Dom Miguel, Pedro's younger brother, who had been appointed regent, usurped the throne, and began to rule without regard to the constitution. His fierce despotism provoked a civil war, which raged for several years, the constitutional troops being led by Dom Pedro, who recruited an army and organized a fleet in support of his daughter's claims. He took Oporto on July 8, 1832, entered Lisbon in July, 1833, and received his brother's submission May 29, 1834. Maria II. was declared of age on Sept. 15, and on the 24th Dom Pedro died, his memory being still cherished under the name of the "soldier king." Several revolutions and counter revolutions have since taken place, the principal result of which has been the substitution of one faction for another in the control of the ministry. The most serious of these outbreaks, that of 1846–'7, was provoked by the unpopularity of the ministry of Costa Cabral, count of Thomar, and but for British, French, and Spanish intervention would have overthrown the government. Maria II. died in 1853, and was succeeded by her son Pedro V., under the regency of Ferdinand of Saxe-Coburg, his father. The regent wisely allowed the Portuguese to govern themselves through their constitutional representatives, inspired his son with a sincere love of free institutions, and retired into the obscurity of private life when the latter attained his majority (Sept. 16, 1855). Pedro V. applied himself to remedy the financial disorders caused by previous revolutions and wars, to lighten the public burdens, and to promote all the arts of peace. At the breaking out of the yellow fever in 1861, the young king exposed himself in assisting the plague-stricken, and was one of the victims (Nov. 11). His brother and successor, Louis (Luiz) I., born Oct. 31, 1838, continued the same policy, multiplied railway and telegraph lines, abolished slavery in the colonies in 1868, held industrial exhibitions at Oporto in 1866 and 1872, and consolidated the floating debt in 1873.

PORTUGAL, Language and Literature of. The Portuguese, like the Spanish, to which it bears a strong resemblance, is one of the modern forms of the Romance language, which in the middle ages imperceptibly took the place of the Latin. It may be traced as far back as the 11th century, in which began likewise the existence of Portugal as an independent state; but the first attempts to cultivate and refine it were not made until the 13th century; and it was only in the 16th, the golden age of Portuguese literature, that it was permanently fixed in its present form. During the domination of the Moors the language of that people prevailed throughout the country, and was generally spoken by the higher classes; and the words borrowed from the Arabic and other eastern sources, and still in use, are probably not less numerous in the Portuguese than in the Spanish. The Portuguese bears a strong affinity to the Galician, and is readily understood by the Gallegos; and it is softer, sweeter, and more fluent than the Spanish. Sismondi felicitously called it "a boneless Castilian." The Spaniards call it a language of flowers; and a modern Portuguese writer, Francisco Dias, styles it the eldest daughter of the Latin, while it is called by Hallam the soft and voluptuous dialect. The pronunciation partakes of the character both of the French and of the Spanish, and is very difficult for foreigners; but it is unobstructed by those gutturals and harsh aspirates which the Spanish inherited from the Arabic. There are in Portuguese five double consonants, called *prolacões: ch*, like the English *sh*, save in words of Greek origin, where it is sounded as *k; lh* (liquid *l*), like *li* in *Julia; nh*, corresponding to the French liquid *gn*, and the English *ni* in *pinion; ph*, as in the English; and *rr*, occurring only between vowels, and having a stronger and rougher sound than the single *r*, but not the aspiration characteristic of the Spanish *rr*. The *j* is mostly pronounced as in French (*zh*), as is also the *g* when followed by *e* or *i*. *C* before *e* or *i*, and *ç* before *a*, *o*, or *u*, have the hard sound of *s*. *S* between two vowels has the soft sound of *z*. *X* has four sounds: that of the English *sh*, as in *paixão*, passion; that of *s* hard, as in *extendo*, extending, *duplex*, duplex; that of *z*, as in *exacto*, exact; and that of the English *x*, as in *sexo*, sex, *convexo*, convex. Final *z* has the hissing sound of *s*, as in *perdiz*, partridge. Among the vowels, the *e* is remarkable as having three sounds, two of which correspond respectively to the long and short sounds of the Spanish *e*, while the third partakes of the nature of the so-called mute *e* of the French. The *o* has likewise a long and a short sound, resembling those of the same vowel in English. The most remarkable features of Portuguese orthography and orthoëpy are the five nasal vowels *ã*, *ẽ*, *ĩ*, *õ*, *ũ* (of which, however, only *ã* and *õ* are now commonly used in writing), sometimes also written without the *tilde* (˜) when it is replaced by *m* or *n* after the vowel. But in these combinations, which are respectively pronounced nearly as the English *ang*, *eng*, *ing*, *owng*, *oong*, the vowels do not lose, as in the corresponding French combinations, their own natural sound. In such words as *sõda* and *tẽpo*, the tilde marks the omission of the letters *n* (*sonda*) and *m* (*tempo*). There are but two written accents, the circumflex (ˆ) and the acute (′). The grammar, resembling those of the Spanish and French, is in general simple, the only peculiarity requiring particular notice being the inflections of the infinitive mood of the verb, which, besides the ordinary impersonal form, has a personal form governed by a noun or pronoun: thus, *amar*, to love; *o eu amar*, I to love, or my loving; *o tu amares*, thou to love, or thy loving. The Latin words which form the basis of the Portuguese have in some instances undergone greater changes than in any other modern tongue. Some radical letters are almost always omitted, the consonants *l* and *n* being most frequently dropped: thus, Lat. *dolor*, Port. *dôr;* Lat. *ponere*, Port. *pôr;* Lat. *populus*, Port. *povo;* Lat. *ille*, *illa*, Port. *o*, *a;* Lat. *pater*, Port. *pai* or *pae*. But many Latin words have been retained literally, and others have suffered only a slight alteration; as *forca* from *furca*, *goloso* from *gulosus*, *ouro* from *aurum*, *digo* from *dico*, *amigo* from *amicus*, *chamar* from *clamare*, *peito* from *pectus*, &c. Of Portuguese grammars may be mentioned Constancio's *Grammatica analytica da lingua portugueza* (Paris, 1831), and *Nouvelle grammaire portugaise* (1832); Vieyra's "Grammar of the Portuguese Language" (13th ed., revised by Henriquez, London, 1869); and Grauert's "New Method for Learning the Portuguese Language" (New York, 1863). There are dictionaries by Da Costa and Sa (Portuguese, French, and Latin, Lisbon, 1794), Da Cunha (French and Portuguese, Lisbon, 1811), Vieyra (English and Portuguese, new ed., Lisbon, 1860), and José de Lacerda (Portuguese-English and English-Portuguese, Lisbon, 1866).—Portuguese literature comprises few works of any note except poems and histories. The earliest compositions on record are contained in a collection of lyrical poems in the amatory style of the troubadours, preserved in the college of nobles in Lisbon, of which 25 copies were published by Lord Stuart of Rothesay (Paris, 1823). These ancient songs, some of which are translations from Provençal, are referred to the beginning of the 13th century. But Bouterwek mentions fragments from poets of the 12th century, Gonçalo Henriques and Egaz Moniz Coelho, courtiers of Alfonso I. During the 13th and 14th centuries the poetic art was fostered by several princes, such as King Dionysius, his natural son Alfonso Sanches, Alfonso IV., Pedro I., and the infante Dom Pedro, son of John I. and author of some amatory poems, included in Resende's *Cancioneiro* (1516). At the same time the romances of chivalry had been diligently cultivated, especially by Vasco de Lobeira, the reputed author of "Amadis de Gaul," derived, as some have thought, but upon insufficient evidence, from a French metrical composition. During the 15th century, which has been called the heroic age of Portugal, prose compositions became both numerous and important. Fernando Lopez, the Portuguese Froissart, Gomez Eannes de Azurara, another chronicler, and Alfonso V., who wrote a treatise on the art of war and a little work on astronomy, are among the most noteworthy names of this period. King Edward (died 1438) composed a treatise *De Bono Regimine Justitiæ;* and Damião de Goes is known as the author of *De Moribus Æthiopum* and a chronicle of King Emanuel. Among the few specimens of noble prose in the Portuguese language, one of the earliest is the *Menina e Moça* of Ribeiro, a pastoral romance in a chaste and pleasing style, much of the charm of which, however, is marred by obscure allusions to events in the author's life. Ribeiro was also the first distinguished poet of his country, and excelled chiefly in pastoral strains, the favorite style throughout the peninsula at the time. Some of his eclogues were written and possibly published before the death of King Emanuel in 1521. Among the pastoral authors contemporary with Ribeiro were Christovão Falção and Sa de Miranda (died 1558), the latter a versatile writer, who, like some other poets of his country, wrote in both Portuguese and Castilian; he left pastorals, sonnets, hymns, songs, and two comedies, *Os estrangeiros* and *Os Vilhalpandios*. Montemayor (died 1562), though a Portuguese, wrote much in Castilian, and ranks among the most illustrious reformers of Spanish poetry in the reign of Charles V. Another of the classical poets is Antonio Ferreira (1528–'69), whose odes are little inferior to those of Horace, and whose sonnets rival those of Petrarch in simplicity and correctness. Before the theatre existed in Spain, and when it was still in its infancy in Italy, he produced his *Ines de Castro*, a tragedy in the ancient Greek style. Other illustrious names in this age are those of Pedro de Caminha and Diego Bernardes, bucolic and elegiac poets; Gil Vicente, at once eccentric and original in his dramatic sketches; Rodrigues Lobo, who left pastoral romances and a historic epopœia on Nuno Alvarez Pereira, the Portuguese Cid; and Jeronymo Cortereal, author of a noble and pathetic poem inspired by the misfortunes of Manoel de Souza and his consort Leonor de Sa. His "Siege of Diu" is less generally esteemed. During this period Portugal produced a great historian, Barros (1496–1570), whose *Asia portugueza*, in which he recounts the romantic story of the Portuguese conquests in the East, deservedly ranks for accuracy and simplicity among the classics of his time. The exploits of Vasco da Gama were related by Fernam Lopez de Castanheda, in his history of the discovery of the Indies. Mendez Pinto, Galvão, and Francisco Alvarez published accounts of their travels and adventures, and Alfonso d'Albuquerque his "Commentaries." Camoëns (1524–'79) is the most intensely national of all the poets. His great epic, the "Lusiad," ranking at once among the earliest and most celebrated of modern Europe, weaves into the story of Vasco da Gama all that was chivalrous, beautiful, or noble in the traditions of his native land. Among the few defects more commonly criticised in the "Lusiad" are the antique language in which it was written, its prolixity, and the absence of poetical artifice, ornament of diction, or brilliant imagery; but these faults are amply compensated for by ease and transparency of narration, a freedom from all that might offend, remarkable familiarity of style, a certain charm of coloring, and especially by a pervasive languor which perpetually reminds us of the fortunes of the soldier poet. Camoëns also left odes, hymns, elegies, and sonnets, in which last he emulates and often equals Petrarch in tenderness, grace, and classic correctness. In these minor compositions, as in his epic, he may be regarded as the principal model for all his countrymen to the present time. The dramatist Gil Vicente (died 1557) was the disciple of the Spaniard Juan de la Encina. His *autos* differ little from the miracle plays and religious dramas of France and England of the same period. His comedies, tragi-comedies, farces, and pantomimes, published collectively in 1562, derive their merit rather from truthfulness of character and vivacity of dialogue than from fertility of invention. The *Ulyssea*, an epic on the foundation of Lisbon by Pereira de Castro (1571–1632), and the *Malacca conquistada* of Francisco de Sa de Menezes, rank high in the opinion of Portuguese critics. Bernardo de Brito (1569–1617) undertook a history of the kingdom, under the title of *Monarchia lusitana;* but he began at the creation of the world, and death overtook him when he had just reached the conquest of the Arabs. The work was ably continued by Antonio Brandão (1584–1637). Manoel de Faria e Sousa (1590–1649) once enjoyed a brilliant reputation, but the quantity and variety of his works, mainly sonnets and eclogues in Castilian, are more remarkable than their excellence. His prose productions comprise several histories. Antonio Barbosa Bacellar (1610–'63) introduced those amorous and melancholy soliloquies called *saudades*. Jacinto Freire de Andrade (1597–1657), a writer of burlesque poetry, was also admired for an elaborate and affected "Life of João de Castro" in prose. Jeronymo Bahia is notable as one of the many poets who chose for their theme the loves of Polyphemus and Galatea, a subject which Andrada burlesqued with much humor. The island of Madeira is the birthplace of Francisco de Vasconcellos, one of the most natural poets of the time. The Portuguese drama in the 17th century was eclipsed by the splendid productions of the Spanish playrights, then so popular throughout the peninsula; the few genuine poets, such as Matto, Fragoso, Diamante, and Melo, wrote almost exclusively in Castilian; and the only national productions of merit were farces, afterpieces, and *zarzuelas*, the best of which during a period of 60 years were collected by Coelho Rebello in his *A musa entretenida de varios entremeses* (Coimbra, 1658). The best religious productions of this period, mainly emanating from the cloister, embrace lives of saints and martyrs by Fray Luis de Souza and João de Lucena; the sermons of the Jesuit Antonio Vieira and of Fray Antonio Veio, both remarkable for purity and vigor of style; and the touching *Cartas portuguezas* of the nun Marianna Alcoforado. A miscellaneous writer also arose in this epoch, Macedo, a priest, to whose astoundingly prolific pen are attributed 2,648 heroic poems and 110 odes, besides a host of essays; but nearly all are in Latin, Spanish, or Italian. During the first half of the 18th century Portuguese literature was strongly impregnated with the French style of the period of Louis XIV. and Louis XV., and Portugal was flooded with translations or imitations of the masterpieces of that epoch. Francisco Xavier de Menezes, count of Ericeira (1673-1743), sang the exploits of Henry of Burgundy in his *Henriqueida*, a dull epic in imitation of Voltaire's *Pucelle*, and translated Boileau's *Art poétique;* while the *Lutrin* of the latter is almost parodied by Diniz da Cruz in his *Aspersorium*. The comedies of Molière and the tragedies of Voltaire were extensively imitated, but no original work of merit was produced during this whole period. Some excellent compilations appeared, the most remarkable of which was the *Bibliotheca lusitana* of Diego Barbosa Machado (1682–1770), comprising the lives of all the Portuguese writers of eminence down to the middle of the 18th century. Another compilation, *A Lusitania illustrada*, embraces the best fugitive compositions of the time, mostly sonnets. Pedro Antonio Correa Garção (1735–'75) wrote several comedies in imitation of Terence, and was associated with Diniz da Cruz e Silva, Manoel Nicolem Esteves Negrão, Francisco José Freire, and Domingos dos Reis Quita, as founder of the Arcadian academy in Lisbon (1756), subsequently replaced by the royal academy of sciences. The countess Vimeiro produced in 1788 *Osmia*, the only genuine tragedy in the language. Araujo de Azevedo translated Dryden, Gay, and some other English poets. Francisco Manoel do Nascimento (1734–1829) was noted for the dignity and boldness of his lyric verses; and Manoel Barbosa du Boccage (died 1805 or 1806) was chiefly known as a lyrical poet, under the pseudonyme of Elmano, and as the founder of the Elmanist school, strongly identified with that of the Gongoristas in Spain. Besides these, the chief authors of the early part of the present century are Francisco Diaz Gomez, Francisco Cardoso, Alvarez de Robriga, Xavier de Matos, Valladares, Tolentino de Almeida; Antonio de Castilho, a translator from the English; Garret, a poet, romancist, and dramatist; Herculano de Carvalho, a patriotic and religious poet; Mouzinho de Albuquerque, a statesman and the author of georgics; Agostinho de Macedo, who reformed the "Lusiad" in an epic entitled *O Oriente*, and whose romantic poem *A Meditação* inaugurated the renaissance of Portuguese literature; and Almeida Garret, author of *Camoëns*, an epic in 10 cantos (1825). Lyrical poesy at the present time is represented by João de Lemos, Castilho, and Antonio Serpa; the drama by Mende Real, José Freira de Serpa, and Alexandro Herculano, which last, with Rebello de Silva, is the most popular historian and author of historical romances; while in the domain of science the names of Oliveira Pimental, Carlos Ribeiro, Thomas de Carvalho, José Lourenço da Luz, and Souza Pinto enjoy a well merited reputation in Europe.—To the Jesuits are due the earliest efforts to introduce literary culture into Brazil, through the medium of religious dramas, many of which were written in Portuguese and Indian. But the productions of the Portuguese colonists were for a long time mainly servile imitations of Portuguese and Spanish originals. In the first half of the 18th century Brazil began to have a genuine national literature, and several literary societies were organized, especially in Bahia, then the viceroyal seat and the most flourishing city in the colony. Among the best known Brazilian writers of this period are mentioned João Brito de Lima (1671–1742), who left the *Cesaria*, an epic of 1,300 octaves in praise of the viceroy Cezar de Menezes, a celebrated friend and protector of letters; and Gonzalo Soares da Franca, like the former a member of the academy *Dos Esquecidos*. The first well written history of Brazil belongs likewise to this epoch, and is due to the pen of Sebastião da Rocha Pitta. After the transfer of the viceregal residence to Rio de Janeiro in the second half of the 18th century, the study and cultivation of letters took, with the accretion of this new centre, a still higher flight than before; and from 1756 down to the present time literature in Brazil has made much more rapid progress than in the mother country. Three epic poets of note appeared in the 18th century: José Basilio da Gama (1740–'95), whose principal work is his *Uruguay*, in which he describes the united crusades of the Spaniards and Portuguese against the Paraguayan Indians; José de Santa Rita Duram or Durão (1737–'83), an Augustinian hermit, author of *Caramurú*, an epic on the discovery of Bahia; and José Francisco Cardoso, who composed a heroic poem in Latin, which was translated into Portuguese by Barbosa du Boccage. These productions, however, in common with all the others of the same period, were to a great degree of Portuguese inspiration, the authors themselves having for the most part completed their education at the university of Coimbra. The character of the lyrical muse was still less national than that of the epopee, thanks to the influence of the pseudo-classic French style, no less sensibly felt in Brazil than in the mother country. The most distinguished lyrical poets of that time were Claudio Manoel da Costa (1729–'89); Thomas Antonio Gonzaga, better known as Dirceu (1744–1809), born in Oporto; Manoel Ignacio da Silva Alvarenga, and Alvarenga Peixoto, all of the Minas school. Among the many distinguished pulpit orators of Brazil may be mentioned Francisco José de Carvalho, also known by the pseudonyme of Francisco do Monte Alverne (1784–1858), whose efforts toward the culture and refinement of the language were only equalled by those of Marianno José Pereira da Fonseca, marquis of Maricá (1773-1848), the author of *Maximas, pensamentos e reflexões*, and the lexicographer Antonio de Moraes e Silva, best known by his *Diccionario de lingua portuguesa*, and his *His-*

toria de Portugal, translated from the English. The 19th century has so far been marked by the inauguration of the drama and of works of fiction in Brazil, the first by the tragedies of Domingos José Gonçalves de Magalhães, *Antonio José ou o Poeta e a inquisição*, and *Olgiato* (1838–'9); and the second by Caetano Lopes de Moura's translations of some of the best works of Marmontel, Mme. de Genlis, Chateaubriand, Scott, and Cooper, and Goethe's *Werther*. Other novelists are Joaquim Manoel de Macedo, Antonio Gonçalves Teixeira e Souza, and Norberto de Souza Silva. But principal among the works whose fame has reached beyond the limits of the empire is Fr. Adolpho de Varnhagen's *Historia geral do Brazil*, alike remarkable for perspicuity of style and purity of diction.

PORTUGAL, Wines of. Although by its geographical position and geological conformation Portugal is peculiarly adapted to the cultivation of the grape, its natural advantages have been obstructed, if not almost neutralized, by the ignorance, indolence, and cupidity of the viticulturists, who for more than two centuries have generally contented themselves with manufacturing a factitious wine, which is exported almost exclusively to England, and has long been regarded by Englishmen as a genuine product of the vine. The Portuguese wine of commerce, known as port from the town of Oporto, near the mouth of the river Douro, is produced from grapes grown in the valley of that river and in those of certain of its tributaries, including the Corgo and the Penhão. The wines of the Alto Douro or Corgo district are those of the highest repute; but lower down in the valley is produced a species of dry, red, natural wine, called *consumo*, which from its cheapness, purity, and dietetic qualities is destined probably to prove a formidable rival to the more costly products of the upper Douro. Other wines of Portugal, mostly of local reputation, are the growth of Alemquer, Torres Vedras, Lamego, and Monção, which last has a high celebrity, and those of Lisbon, Bucellas, Termo, Calcavellos (dry white wines), and Colares (a red wine, long exported to England, and still, though less abundantly, as Colares port). The wine of Barra-a-Barra, in the vicinity of Lavadrio, has been praised as one of the richest produced by Portugal. The common wines of the country are mostly inferior to those of Spain. England, as has been observed, is the chief consumer of port wine, and none reaches that country containing less than three gallons of brandy to the pipe of 115 gallons, while the so-called rich wines contain from five to six times that amount of alcoholic admixture. The natural wine, produced in a good year, resembles the Côte Rôtie or others of the Rhône growths. It contains from 9 to 14 per cent. of alcohol, and would not be recognized by those accustomed only to the wine of commerce, which has an alcoholic strength equal to 40 per cent. of proof spirit. "The principal reason for the addition of brandy to port wine is this, that it is the quickest and most certain means to make the wine marketable and salable to the consumer. The wine is not made drinkable any earlier than it would have been without the addition of brandy; on the contrary, it would have matured quicker in its natural state. But the brandy brings it into a quiescent condition; it is not liable to any subsequent little fermentations; it may be exported to climates hot and cold; in other words, with 40 per cent. of proof spirit in it, port wine will keep." (Thudicum and Dupré, "Treatise on Wine.") Port wine, therefore, unbrandied, could not be shipped to a foreign market in less than six or seven years from the time of its expressing. Fortified with brandy, it can be shipped within three or four months after the vintage, and is actually consumed in large quantities in England when less than a year old. Port wine is most effectually mellowed in large casks. The intelligent buyer will of course keep it in the bottle for seven or eight years, until the alcoholic taste is dispelled, and the true flavor of the wine recovered; but most persons who use port, having neither the means nor the patience to do this, habitually drink a wine containing 10 per cent. more of alcoholic strength than is healthful, and every glass of which equals in strength more than two fifths of a glass of brandy. Statistics show that within a period of ten years England has been in the habit of exporting annually to Portugal spirits equal in amount to one half the wine she received from that country, the presumption being that the British consumer has really been dearly buying back British spirits under the name and guise of port wine. The predilection of the English people for the fortified wines of Portugal, and the production of such wines, are traceable to the wars between France and England, which occupied so many years of the reign of Louis XIV. Previous to the close of the 17th century the red wines of France were extensively used in England, while those of Portugal were scarcely known there. But a bitter hostility to France induced the British government to negotiate with Portugal in 1703 what is known as the Methuen treaty, by the terms of which it agreed to receive Portuguese wines in exchange for British woollen manufactures, at one third less duties than those of France, thus practically excluding the latter from the country. For a few years pure wines were imported, but about 1715–'17 they began to be brandied, while the duties were reduced to about one eighth of those paid on French wines. The taste for port wine was thus forced upon the people by their rulers. "There is no necessity," says Redding, "to search for any other reason why port wine was so generally drunk in England. It was no intrinsic worth in the wines themselves which introduced them. Englishmen became wedded to long usage, and numbers believed port wine the only real red wine in the world." ("History and Description of Modern Wines.") In 1756 a monopoly of the wine country of the upper Douro was given to a company, and from that date began the adulteration and deterioration of those wines, although sophistications of them had been complained of 25 years earlier. This monopoly extended to 1833, and during its existence the quality of the wine steadily deteriorated, while the admixture of alcohol reached its maximum. The company made no scruple of purchasing inferior wines to dispose of as port or to mingle with the genuine product of the Douro vines, and defended its practice of brandying them by asserting that the English could not have their wines too strong, although before the monopoly was established very little brandy had ever been used in England. As an illustration of the degree to which the wine has been doctored within a recent period, to meet the vitiated English taste, the following formula for making port wine of the first quality is quoted from Dr. Druitt's "Report on Cheap Wines" (2d ed., rewritten and enlarged, London, 1873): "To the pipe of half fermented must is added, to check fermentation:

	25	gallons of brandy..............	= 37·5	proof gallons.	
Say	5	" of elderberry juice to color.			
	6	" more of brandy.........	= 9	"	"
	2	" " after racking......	= 3	"	"
	1	" " on shipment......	= 1·5	"	"
	39	liquid gallons..................	= 51	"	"
	76	of wine.			
	115	gallons of port wine.			

Taking the probable strength when half fermented at 14° (the highest natural strength known being 28°), the strength would thus be about 42° or a little above it." Port wine of this description is still largely imported into England, but those who drink it are of a different class from its former consumers, who have gradually substituted the light, genuine wines of France or Germany. What is known as *jeropiga tinta*, that is, must checked at the height of its fermentation by the admixture of 32 per cent. of proof spirits, and colored with elderberries, is largely imported into the United States under the name of "pure juice."—The island of Madeira, discovered by the Portuguese in 1419, was planted as early as 1421 with vines alleged to have been brought from Candia and Cyprus. Within a century and a half their products had reached a high degree of excellence, and they maintained their reputation until near the middle of the present century, when spurious wines, sold under the name of Madeira, began to affect the production of the genuine wines, which was subsequently almost paralyzed by the oidium or grape blight, which visited the island with peculiar severity. The wines in most repute are the malmsey and dry madeira, produced respectively from the Malvasia and Vidogna grape, and the *sercial* and *tinto*. The best vineyards are on the S. side of the island, those on the N. side being mainly used for distilling brandy. When new, the wines of Madeira are of great body, and so harsh and rough as to be unfit for use until toned down and matured by age, or subjected to a sea voyage, the heat and motion of which accelerate the oxidation of the extractive and astringent principles of the wine, and promote an earlier formation of the ethers to which it owes its flavor. A voyage to the East Indies was once supposed to be indispensable to ripen Madeira wines, but it is now known that motion and heat will accomplish the same purpose in any climate. A pipe of wine attached to the beam of a steam engine in an engine house, where the temperature is uniformly high and the motion continual, has been matured within a year so as not to be distinguishable from the choicest East India. The wine not subjected to these accelerating processes requires about six years to ripen, and previous to exportation receives from three to four gallons of brandy to the pipe of 92 gallons. The brandy is also the product of the island. The best Madeira wines are the malmseys, which are more or less amber-colored, dry, and of a peculiar nutty flavor. They were largely consumed in America and the West Indies as early as the beginning of the 18th century, and in the United States have always been in great repute. Notwithstanding the supply has for many years failed, a considerable stock is still held here. The vintage of 1874 in Madeira is said to have been excellent in quality, and so abundant that the resources of the island were severely taxed to supply the means of putting the wine in casks. (See Madeira.)

PORTUGUESE MAN-OF-WAR. See Jelly Fish.

PORTULACA. See Purslane.

PORUS, the Greek form of the name of several kings of India, two of whom were met by Alexander in his conquest of the East. The first ruled E. of the Hydaspes, and when the Greeks attempted to cross that river he prepared to dispute its passage at the head of a large force and with more than 200 trained elephants. Alexander forded the stream higher up, and in the desperate battle that ensued prevailed by his superior generalship. Porus was forced to flee after seeing two of his sons slain and being himself severely wounded. Being captured, he was honorably treated, and became Alexander's ally, accompanying him in several expeditions. Alexander enlarged his dominions, so that they extended from the Hydaspes to the Hyphasis, and were said to include seven nations and more than 2,000 cities. He was treacherously put to death by Eudemus, who was left commander of the Greek troops in that region. It is said that he was five cubits in stature.—His cousin of the same name ruled at the same time over Gandaris, E. of the Hydraotes. He fled on the approach of Alexander, and his dominions were given to his kinsman, to whom he had previously been hostile.

POSEIDON. See Neptune.

POSEN. I. An E. province of Prussia, bounded E. by Russian Poland, and bordering on the provinces of West Prussia, Brandenburg, and Silesia; area, 11,178 sq. m.; pop. in 1871, 1,583,843, including 1,009,491 Catholics, 511,292 Protestants, and 61,982 Jews. It is divided into the districts of Posen and Bromberg. The German element in the population is gaining ground, the Poles in the former district being in 1871 reduced to 59 per cent. and in the latter to 47 per cent. The country is level and has many lakes and marshes. The main rivers are the Vistula, Warthe or Warta, Netze, and Brahe. Posen is one of the most important agricultural regions of Prussia, and also exports much timber. There are manufactories of linens, woollens, and other goods.—The first partition of Poland (1772) gave to Prussia the Netze district of Great Poland, including all the territory of Posen N. of the Netze. The further spoliation of Poland gave to Prussia the rest of the province, which formed a part of what was then named South Prussia. In 1807 Napoleon annexed Posen to the duchy of Warsaw. The treaty of Vienna in 1815 restored it to Prussia as a grand duchy. A Polish outbreak in 1846 was easily suppressed, and in 1848 the insurgents under Mieroslawski were disarmed after a severe struggle. **II.** A city (Pol. *Poznań*), capital of the province and of the district of Posen, on the Warthe, in a sandy region, 145 m. E. of Berlin; pop. in 1871, 56,374. The fortifications, begun in 1827, are very strong, and consist of outer works and three forts, one a citadel. The principal public buildings are the fine old town hall, the church of St. Stanislas, the cathedral with a rich chapel containing statues by Rauch, and the palace of the archbishop of Gnesen and Posen. There are a Catholic and a Protestant gymnasium and several seminaries, and the city is one of the centres of Polish literature. Grain, timber, wool, cloth, and linen are the chief articles of trade. Furniture and other articles are manufactured.—Posen is of great antiquity. The see dates from the 10th century. The monarchs of Poland resided here till the end of the 13th century. In the middle ages it belonged to the Hanseatic league. Subsequently it declined until the present century, when the Prussians considerably enlarged and embellished the town.

POSEY, the S. W. county of Indiana, separated from Kentucky by the Ohio river and from Illinois by the Wabash; area, about 400 sq. m.; pop. in 1870, 19,185. It has an undulating surface, a very fertile soil, composed in part of extremely rich bottom lands, and an abundance of coal. It is intersected by the St. Louis and Southeastern railroad. The chief productions in 1870 were 393,930 bushels of wheat, 931,936 of Indian corn, 80,633 of oats, 38,321 of barley, 30,041 of potatoes, 118,408 lbs. of butter, 23,748 of wool, 56,450 of tobacco, and 7,027 tons of hay. There were 5,383 horses, 1,052 mules and asses, 4,101 milch cows, 5,517 other cattle, 9,422 sheep, and 27,157 swine; 13 manufactories of carriages and wagons, 19 of cooperage, 6 of furniture, 7 of saddlery and harness, 1 of woollens, 1 distillery, 13 flour mills, and 4 saw mills. Capital, Mount Vernon.

POSEY, Thomas, an American general, born on the banks of the Potomac, Va., July 9, 1750, died in Shawneetown, Ill., March 19, 1818. In 1774 he took part in Lord Dunmore's expedition against the Indians, and participated in the battle at Point Pleasant, Oct. 10. In 1775 he was a captain in the 7th Virginia regiment, aided in defeating Dunmore at Gwyn's island, and afterward joined Washington's army. In 1777, as a captain in Col. Morgan's rifle corps, he distinguished himself in the actions of Piscatancey, Bemus Heights, and Stillwater. In 1778 he was temporarily in command, and in October led his corps in an expedition against the Indians. In 1779 he took command of the 11th Virginia regiment, and afterward of a battery under Gen. Wayne. He took part in the assault on Stony Point, was present at the surrender of Yorktown, and served in Georgia till the conclusion of peace, when he removed to Spottsylvania co., Va. In 1793 he was appointed brigadier general in Wayne's army for the protection of settlers in the Northwestern territory. He afterward removed to Kentucky, where he was elected to the state senate, of which from Nov. 4, 1805, to Nov. 3, 1806, he was presiding officer, and acting lieutenant governor of the state. In 1812 he removed to Louisiana and was elected United States senator. From 1813 to 1816 he was governor of Indiana.

POSIDONIUS, a Greek stoic philosopher, born in Apamea in Syria, probably about 135 B. C., died in Rome about 51. He studied at Athens under Panætius, and settled in Rhodes, where he became the head of the stoic school, was elected *prytanis*, and in 86 was sent as ambassador to Rome. He gave instruction to Cicero, and was on friendly terms with Pompey. None of his works exist entire; the fragments were published by Jacobus Bake (*Posidonii Rhodii Reliquiæ Doctrinæ*, Leyden, 1810).

POSITIVISM, or Positive Philosophy. See Comte.

POST, a public establishment for the conveyance of letters, newspapers, &c. The Assyrian and Persian monarchs had their posts placed at stations a day's journey from each other, with horses saddled, ready to carry with the utmost despatch the decrees of the despot. In the Roman empire couriers on swift horses passed from hand to hand the imperial edicts to every province. Private letters were sent by slaves, or intrusted to casual opportunities. Charlemagne, it is said, established stations for couriers, who delivered small packets, letters, and decrees, from the court to every part of the realm; but after his death these stations were abandoned. In 1464 Louis XI. revived the system of mounted posts, stationing them four leagues apart, and requiring them to be ready night and day to carry government messages as rapidly as possible. Similar posts, the riders of which were called *nuncii*, were established in England in the 13th century, exclusively for the transmission of government despatches. As late as the 15th century, butchers or drovers, who went about buying cattle, were the principal carriers of private letters. In the 12th century the university of Paris established a body of pedestrian messengers, who bore letters from its thousands of students to the various countries of Europe from which they came, and brought to them the money they needed for the prosecution of their studies. The great development of commerce following the crusades, and the geographical discoveries of the Italians, Portuguese, and Spaniards, created a necessity for business correspondence about the beginning of the 16th century. The royal *nuncii*, or post riders, had already found it for their advantage to use their surplus horses for the conveyance of passengers, and thus the system of posting, or travelling with post horses, came into vogue. These posts were now used for the carriage of private letters, at first irregularly, and without fixed compensation or regular periods of arrival or departure, but eventually with considerable order and system. The earliest of these posts for general accommodation in Europe was established in 1516 between Brussels and Vienna by Franz von Thurn and Taxis. His successors received from the emperors of Germany repeated enfeoffments of the imperial post, and extended it over the greater part of Germany and Italy. Venice, Genoa, Leghorn, and Naples were thus connected with Hamburg, Bremen, Lübeck, and Frankfort, and the active commerce which had sprung up among these cities was greatly facilitated. The counts of Thurn and Taxis retained this postal monopoly till the dissolution of the German empire in 1806. In 1524 the French posts, which previously had only transmitted the letters and messages of the king and nobles, were permitted to carry other letters. In 1581 Thomas Randolph was appointed chief postmaster of England, but his functions seem to have pertained more to the establishment and supervision of post houses, and the regulation of fees for posting, than to the transmission of letters. In Peru, in 1527, the Spanish invaders found a regular system of posts in operation along the great highway from Quito to Cuzco, and messages as to the progress of the invasion, as well as other subjects, were forwarded to the inca by fleet-footed runners, who wound around their waists the *quipu*, a species of sign writing by means of knotted cords.—The complete organization of a system of postal communication in England did not take place till the reign of James I., who soon after his accession constituted the office of postmaster of England for foreign parts, and appointed Matthew Le Quester the first postmaster. In 1635 the postmaster general was ordered to establish a running post between London and Edinburgh, to go night and day, and come back in six days. In 1644 Edmund Prideaux, then a member of the house of commons, was appointed master of the posts, and first established a weekly conveyance of letters into all parts of the kingdom. In 1656 an act was passed to settle the postage of England, Scotland, and Ireland, fixing the rates of letter postage and the prices for post horses. The rates of postage previous to this act were for a single piece of paper: under 80 m., 2*d.*; between 80 and 140 m., 4*d.*; above 140 m., 6*d.*; and on the borders and in Scotland, 8*d.* The act of 1656 raised these rates (which were in all cases for a single letter) to 14*d.* for a distance of more than 300 m., from which sum they were diminished according to the distance down to 2*d.* for 7 m. and under. Between this period and 1838 more than 150 acts relative to postal affairs were passed, but the rates of postage were not materially changed. These rates operated as an almost prohibitory tariff on letters through the mails, and all manner of devices for avoiding the payment of postage were adopted. The franking privilege, which at an early period had been granted to members of parliament and officers of the government, was much abused. In 1838 the franked and privileged letters amounted to 30 per cent. of the whole number transmitted through the mails. In 1784 the net revenue of the post office did not exceed £150,000; but by the introduction of fast mail coaches soon after that date, it had risen in 1815 to about £1,600,000, at which point it remained stationary for more than 20 years, in consequence of the abuse of the franking privilege, and the methods adopted to evade the payment of postage. In 1837 Rowland Hill, who was not then connected with the post office department, published a pamphlet on post office reform; his plan was adopted by parliament in 1839, and went into operation in 1840, under the supervision of its originator. Its principal provisions were: the reduction of all inland postage to a uniform rate, 1*d.* for a single half ounce; the weight of a letter, and not the number of pieces, to form the basis of the rate; the entire abolition of the franking privilege; the despatch of the mails at more frequent periods; and increased speed in the delivery of letters. To these were subsequently added payment by stamps and prepayment. In 1848 the transmission of books by post was granted, at first at 6*d.* per lb. This was subsequently modified so as to give increased facilities for forwarding proofs, pictures, and indeed everything except manuscripts and letters, at low prices. The rates to the colonies are also such as to encourage the transmission of letters and small packages thither by mail. On the introduction of Hill's system there was a falling off in the revenue; but this deficiency soon disappeared. The number of chargeable letters sent through the mails has increased from 76,000,000 in 1838 (the last complete year under the old system) to about 907,000,000 in 1873 (besides 72,000,000 post cards, 129,000,000 book packets, and 125,000,000 newspapers), and the gross revenue from £2,346,000 to £5,348,040, while the net revenue also shows an increase. The head of the British post office department is the postmaster general, who is always a peer of the realm, and generally, though not necessarily, a cabinet minister. There are three general post offices, in London, Edinburgh, and Dublin. In 1855 pillar letter boxes were introduced, and London was divided into ten districts, for greater facility in the distribution of city letters. The rates of postage are as follows: on inland letters not exceeding 1 oz. 1*d.*, not exceeding 2 oz. 1½*d.*, and ½*d.* for every additional 2 oz., except that letters weighing over 12 oz. are charged at the rate of 1*d.* an ounce. If the postage is not prepaid, double rates will be charged on delivery. The postage on newspapers anywhere within the country is a halfpenny each, which must be prepaid by adhesive stamp or stamped wrapper. No package of newspapers must exceed 2 ft. in length, or 1 ft. in width or depth, or 14 lbs. in weight. Unsealed packets of books, paper, printed matter, manuscript, circulars, or photographs will be transmitted, if prepaid, at the rate of ½*d.* for every 2 oz. or fraction of that weight. Packages posted unpaid will be charged double this rate. No packet of printed matter must exceed 5 lbs. in weight, or 18 in. in length, or 6 in. in depth, or 9 in. in width. The franking privilege having been abolished, no matter is transmitted free except addresses to the queen and petitions to parliament, and these must be in covers left open at the ends, and must contain no letters. The fee for registering a letter, newspaper, book, or other package, to be sent to any place within the United Kingdom or colonies, is 4*d.* in addition to the ordinary postage, and must be prepaid. Postal cards may be used only in the United Kingdom; they are sold in packets only at 6½*d.* a dozen. The money order office, which had previously been conducted as a private enterprise by three clerks in the post office, became an official department under the postmaster general in 1838. In 1840 the charge, which had before been somewhat higher, was fixed at 3*d.* for sums not exceeding £2, and 6*d.* for those over £2 and not exceeding £5. The present rates for inland money orders range from 1*d.* on sums under 10*s.* to 1*s.* for £10, which is the maximum amount for which an order will be issued. Foreign money orders are granted between the United Kingdom and Belgium, Denmark, France, Germany, Holland, Italy, Switzerland, Constantinople, Gibraltar, and Malta, at rates ranging from 9*d.* for £2 to 3*s.* for £10; also for most of the British colonies, including India, and Egypt and the United States, at rates ranging from 1*s.* for £2 to 4*s.* for £10. The money order business with the colonies began in 1856, and with foreign countries in 1869. Since the establishment of the system the business has increased with remarkable rapidity. In 1873 there were issued 15,118,636 inland money orders, amounting to £25,600,069, besides 165,807 colonial orders (including those issued in the United Kingdom and in the colonies), amounting to £671,131, and 147,802 foreign orders, to the amount of £531,064. In 1868 parliament authorized the postmaster general to purchase the telegraphic lines in the United Kingdom and operate them as a part of the postal service, for the purpose of giving the public increased facilities for telegraphic communication at reduced rates. To carry out this plan, the postmaster general was empowered to borrow £7,000,000. The government obtained possession of the lines in 1870, comprising 22,086 m. of line, 95,637 m. of wire, and 4,119 stations. In 1873 the number of miles of wire had been increased to more than 105,000, and the number of offices to nearly 5,600. The charge for the transmission of a message to any point in the United Kingdom is 1*s.* for the first 20 words, and 3*d.* for every additional 5 words. Messages, written on stamped cards and forms, may be deposited in a letter box, and are despatched from the nearest postal telegraph office immediately after collection. News and other communications for newspapers may also be forwarded by telegraph. Nearly 18,000,000 messages were sent in 1873, exclusive of those for the press, which amounted to nearly 38,000,000 words. Post office savings banks were established in 1861 for the purpose of affording to the laboring classes more adequate facilities and better security for saving their earnings. Deposits of 1*s.* and upward are received at all money order offices which are also post office savings banks. Interest is allowed at the rate of 2½ per cent. on each complete pound. The number of post office savings banks had increased in 1873 to 4,853, and the amount of deposits to £7,955,740, the average amount being £2 14*s.* 6*d.* The interest credited to depositors amounted to £477,851. The post office department is authorized to insure the lives of persons between the ages of 16 and 60 years, for not less than £20 nor more than £100, and to issue immediate or deferred annuities of not more than £50 on persons between the same ages, thus affording direct government security for the payment of such money. The post office also issues for the inland revenue department licenses on male servants, horse dealers, carriages, dogs, &c. The number of post offices in the United Kingdom in the beginning of 1874 was 12,500, of which nearly 880 were head offices; there were also nearly 9,000 road letter boxes, making the whole number of postal receptacles nearly 21,500, of which more than

1,500 were in London. The post office is a source of considerable revenue to the government. The average net revenue during the five years ending with 1873 was £1,433,610 a year, and during the preceding five years £1,374,411. The following statement shows the gross and net revenue for ten years:

YEARS.	Total postal revenue.	Total cost of postal service.	Net revenue.
1864..........	£4,231,558	£3,078,297	£1,153,261
1865..........	4,423,608	2,941,086	1,482,522
1866..........	4,599,667	3,201,681	1,397,986
1867..........	4.668,214	3,246,850	1,421,364
1868..........	4,683,646	3.266,724	1,416,922
1869..........	4,764,575	3,459,227	1,305,348
1870..........	4,929,475	3,435,865	1,493,610
1871..........	4,900.454	3,610,700	1,289,754
1872..........	5,208,922	3,684,946	1,523,976
1873..........	5,348,040	3,792,679	1,555,361

The revenue from letters, post cards, newspapers, and books during this period has increased from £3,957,047 in 1864 to £5,134,816 in 1873, and that from money order commissions from £151,979 to £208,057.—The existing postal service of the German empire was established April 12, 1871, with about 5,000 post offices. The number is now (1875) much larger, owing to the accession of Baden, Alsace, and Lorraine, to the introduction of postal cards and money orders, the reduced postage on printed matter, and other improvements. Treaties exist with Bavaria and Würtemberg (the only distinctively German territories still outside of the imperial postal area), and with Austria and other countries. The uniform rate of postage for a single letter is 1 silbergroschen or 3 kreutzers (1 kreutzer=0·462 cent), and for a postal card ½ silbergroschen or 1¼ kreutzer. The postal budget of the North German confederation showed a large deficit previous to the abolition in 1869 of the franking privilege, which is now enjoyed only by the crown. The receipts in 1874 in the empire amounted to $22,277,907, the expenditures to $14,503,692, leaving a surplus of $7,774,215. The letters posted in that year, among a population of 34,000,000, numbered 442,000,000, and the newspapers 2,300,000. In France a new era was opened in 1849–'51 by the adoption of postage stamps, and postal cards were introduced in 1873. The rate for a letter is 10 centimes (1 centime=0·182 cent) within the city of Paris, and 15 centimes to any part of France and Algeria. In 1871 the internal postage was increased 25 per cent., and fixed at 40 centimes when not prepaid and 25 centimes for prepaid letters, for each 10 grammes; at 40 centimes for letters exceeding 20 grammes, and increasing in the same ratio for increased weight. The state controls the whole service, and in 1869 derived from it a surplus of 31,000,000 francs, which was reduced by the war in 1870 to 9,000,000 fr., but for 1875 was estimated at 41,000,000 fr. For 1875 the expenses were estimated at 70,386,652 fr., and the receipts at 111,004,000 fr. France has more than 5,000 post offices, and between 300,000,000 and 400,000,000 letters are transmitted annually.—The postal service of Russia shows steady improvement, and generally yields the state an annual surplus of several millions of rubles. The receipts in 1873 were 9,631,943 rubles. The number of letters annually transmitted is nearly 50,000,000. Postal cards are issued at 5 kopeks (1 kopek=0·79 cent) for the whole empire, and at 3 kopeks within a postal district. Russia has about 3,000 post offices; the Austro-Hungarian monarchy, 5,000; Italy, 2,500; Spain, 2,300; Canada, 3,800; British India, 4,000; Australia, 1,500. Postal cards are now generally used in most European countries.—In China the ancient Persian system prevails in forwarding official despatches, and there is hardly any postal service excepting that controlled by foreign governments in connection with the mail steamers. Japan has begun to establish a postal system modelled after that of the United States, under the direction of the treasury department. In 1863 the khedive organized a regular postal service in Lower Egypt. In Turkey the service is ill arranged, and letters are chiefly forwarded by the foreign post offices in the principal seaports.—In the English colonies which subsequently became the United States, a postal system was projected as early as 1692; but owing to the thinness of the population it was not organized till 1710. By act of parliament of that year, the postmaster general of the colonies was "to keep his chief letter office in New York, and other chief offices at some convenient place or places in other of her majesty's provinces or colonies in America." The revenue was for some years very small. In 1753 Benjamin Franklin was appointed deputy postmaster general for the colonies, and was guaranteed the sum of £600 per annum for the salary of himself and his assistant. He remodelled and extended the operations of the office, and in a few years materially increased its revenues. He startled the people of the colonies in 1760 by proposing to run a stage wagon, to carry the mail from Philadelphia to Boston once a week, starting from each city on Monday morning and reaching its destination by Saturday night. In 1774, while in England, he was removed from office. In 1789 the constitution of the United States conferred upon congress the exclusive control of postal matters for all the states; and congress proceeded, immediately upon the adoption of the constitution, to organize the post office department, and to pass the necessary laws for the protection of the mails, &c. The rates of postage from the organization of the department until 1816 were: For a single letter (that is, one composed of a single piece of paper), under 40 m., 8 cts.; under 90, 10 cts.; under 150, 12½ cts.; under 300, 17 cts.; under 500, 20 cts.; over 500, 25 cts. In 1816 these rates were modified as follows: A single letter carried not over 30 m., 6¼ cents.; over 30 and under 80, 10 cts.; over 80 and under 150, 12½ cts.; over 150 and under 400, 18¾ cts.; over 400, 25 cts.; and an additional rate for every additional piece of paper; and if the letter weighed an ounce, four times these rates. Newspapers under 100 m., or within the state where published, 1 ct.; over 100, and out of the state, 1½ ct.; magazines and pamphlets, 1½ ct. a sheet, under 100 m., if periodicals; over 100, 2½ cts. a sheet; if not periodicals, 4 and 6 cts. As the facilities for transportation of the mails by steamboats, railroads, &c., increased, these high rates occasioned much dissatisfaction, and in various ways the law was evaded. For several years letters were carried in large numbers by express between the principal cities, at rates much below those of the post office. The reduction of rates was repeatedly urged in congress, and measures for that purpose were proposed by Edward Everett in 1836; but no well digested plan was brought forward. In 1843 the general discontent was expressed in the form of resolutions by the legislatures of several states, instructing their senators and requesting their representatives in congress to take some measures for a reduction. Mr. C. A. Wickliffe, at that time postmaster general, made some investigation in regard to the English system, and in an elaborate report advocated some reduction, but not a radical one, on the ground that the department would become a heavy charge upon the government if a large reduction were made. In 1845 the following rates were adopted: For a letter not exceeding ½ oz. in weight, under 300 m., 5 cts.; over 300, 10 cts.; and an additional rate for every additional ½ oz. or fraction of ½ oz. Advertised letters, 2 cts. additional; drop letters, 2 cts.; circulars unsealed, 2 cts.; pamphlets, magazines, &c., per oz. 2½ cts., and each additional oz. 1 ct. Newspapers, under 30 m., free; over 30 and under 100, or any distance within the state where published, 1 ct.; over 100 and out of the state, 1½ ct. Carriage by express was prohibited, unless the postage was previously paid. In the next congress an effort was made to raise these rates, as the postal revenue did not defray expenses; it was unsuccessful in regard to letter postage, but transient newspapers were charged 3 cts., and prepayment was required; the postage on circulars was raised to 3 cts.; newspaper postage to Oregon and California was fixed at 4½ cts., and letter postage to the Pacific territories, *via* Chagres and Panama, at 40 cts. In 1849 the postage on transient newspapers was reduced to ordinary newspaper rates, but prepayment was still required. In 1851 another effort was made to raise the postage, which proved unsuccessful; but a law was passed establishing the following rates: For a single letter (*i. e.*, of ½ oz. weight), under 3,000 m., if prepaid, 3 cts., or if not prepaid, 5 cts.; over 3,000 m., 6 or 12 cts.; to foreign countries, not over 2,500 m., except where postal arrangements have been made, 10 cts.; over 2,500, 20 cts.; drop letters, 1 ct.; ship letters, 2 cts., or if delivered where deposited, 6 cts.; if sent through the mails, the ordinary postage to be added. Weekly newspapers, to actual subscribers in the county where published, free; under 50 m. and out of the county, 5 cts. a quarter; over 50 and under 300, 10 cts.; over 300 and under 1,000, 15 cts.; over 1,000 and under 2,000, 20 cts.; over 2,000 and under 4,000, 25 cts.; over 4,000, 30 cts. Monthly papers one quarter, and semi-monthly one half these rates; semi-weekly double, tri-weekly treble, and oftener than tri-weekly five times these rates; newspapers under 300 sq. in., one quarter these rates; if paid quarterly in advance, a deduction of one half to be made from these rates. Transient newspapers, circulars, and other printed matter, 1 ct. an ounce under 500 m.; over 500 and under 1,500, 2 cts.; over 1,500 and under 2,500, 3 cts.; under 3,500, 4 cts.; over 3,500, 5 cts. Books under 32 oz., 1 ct. an ounce if prepaid; if not, 2 cts. an ounce. In 1852 the following modifications were made: Letters sent over 3,000 m., and not prepaid, 10 cts. postage; newspapers, circulars, &c., under 3 oz., 1 ct.; every additional ounce or fraction, 1 ct.; small newspapers and periodicals, published monthly or oftener, and pamphlets of not more than 16 octavo pages, sent in single packages of not less than 8 oz., prepaid, ½ ct. an ounce, or if not prepaid, 1 ct. Books, bound or unbound, less than 4 lbs., under 3,000 m., 1 ct. an ounce; over 3,000, 2 cts. an ounce; 50 per cent. added when not prepaid. By the act of the same year, postage stamps and stamped envelopes were ordered. By a law passed March 3, 1855, and taking effect July 1 of the same year, the rates on single inland letters were reduced to 3 cts. for all distances under 3,000 m., and 10 cts. for all over that distance; and all inland letter postage was to be prepaid. The charge for advertising letters was reduced to 1 cent. In 1863 the rate of postage was made uniform at 3 cts. on all domestic letters not exceeding ½ oz., and 3 cts. additional for every ½ oz. or fraction thereof; on drop letters not exceeding ½ oz., 2 cts. The quarterly postage on newspapers and periodicals sent to subscribers, and not exceeding 4 oz., was fixed as follows: weekly, 5 cts.; semi-weekly, 10 cts.; tri-weekly, 15 cts.; six times a week, 30 cts.; seven times a week, 35 cts. Periodicals issued less than weekly and not exceeding 4 oz. were charged 1 ct. each. The rate for transient newspapers and periodicals was 2 cts. for each 4 oz. or fraction thereof. In 1868 the law was so amended as to allow weekly newspapers to be sent free to regular subscribers residing in the county.—The post office department of the United States is under the direction of a postmaster general, who is appointed by the president with the consent of the senate, is a member of the cabinet, and receives an annual salary of $6,000. He is aided by three assistant postmasters general, whose salaries are $3,500 a year each. There is a superintendent of foreign mails, and one of the money order system, each of whom receives an annual salary of $3,000. Including the officers above named, the total force of the department in Washington comprises 364 persons. The other officers and agents employed in the postal service consist of 34,294 postmasters, 6,232 contractors, 4,228 clerks in post offices, 2,049 letter carriers, 936 route agents, 850 railroad post office clerks, 211 mail route messengers, 124 local agents, and 76 special agents, making a total of 49,374 persons. Postmasters whose salaries exceed $1,000 are appointed for four years, and may be removed by the president with the consent of the senate. The number of this class in 1874 was 1,408; their salaries are limited to $4,000, except in the city of New York, where the postmaster receives $6,000. Postmasters whose salaries do not exceed $1,000, numbering 32,886 in 1874, receive their appointments from the postmaster general. The transportation of the mails is let under contract by the postmaster general. Post roads must be established by congress. The extent of public mail routes has been rapidly increasing. In 1874 the total number was 9,761 (of which 824 were railroad), aggregating in length 269,097 m.; in annual transportation, 128,627,476 m.; in annual cost, including that for clerks, agents, messengers, &c., $18,707,486. The total mileage comprised 67,734 m. on railroads; annual railroad transportation, 72,460,545 m., at a cost of about 12·58 cts. a mile; 18,369 m. by steamboats; annual transportation by steamboat, 4,078,725 m., at a cost of about 20·57 cts. a mile. The other routes upon which the mails are required to be conveyed with "celerity, certainty, and security" comprise 182,994 m., on which the annual transportation is 52,088,206 m., at a cost of about 11·47 cts. a mile. The present rates of postage (1875) are regulated by the laws of June 8, 1872, June 23, 1874, and March 3, 1875. Domestic mail matter is divided into three classes, on all of which prepayment of postage is required. The first class embraces all correspondence wholly or partly in writing (except book manuscript and corrected proof sheets passing between authors and publishers), local or drop letters, and postal cards. The rate of postage on matter of this description, including letters, except local sealed packages, and manuscript for publication in newspapers, magazines, or periodicals, is 3 cts. for each ½ oz. or fraction thereof; on local or drop letters, at offices where free delivery by carriers is established, 2 cts. for every ½ oz. or fraction thereof, and 1 ct. for every ½ oz. at offices not having a free delivery. The second class relates to newspapers and periodicals, on which the schedule of charges is somewhat complicated. Publications of this kind may be arranged in four general divisions: 1. All newspapers and periodicals, mailed from the office of publication or a news agency to regular subscribers or news agents, are charged at the rate of 2 cts. a pound or fraction thereof for those issued weekly or oftener, and 3 cts. a pound or fraction thereof for those issued less frequently than once a week. 2. Newspapers (excepting weeklies), periodicals, and unsealed circulars, which are deposited in a letter carrier office for local delivery by the office, whether through the box or general delivery or by carrier. The rate of postage on all such newspapers (excepting weeklies), periodicals not exceeding 2 oz., and circulars, is 1 ct. each. If the periodical exceed 2 oz., the postage is 2 cts. These rates are applicable whether the publication is sent directly to a subscriber, or is mailed as transient matter. Weekly newspapers coming under this classification are excepted from these rates. Those sent to regular subscribers are charged 2 cts. a pound; others, 1 ct. for each 2 oz. or fraction thereof. 3. Newspapers which are allowed to be transmitted free of postage to subscribers residing in the county where such papers are published. This exemption applies only when the newspaper is received at an office not having carriers. If the office have carriers, regular postage will be charged. 4. Transient newspapers and magazines (not for local transmission), on which the postage is 1 ct. for every ounce or fraction thereof. By the law of 1872 the postage on newspapers and periodicals, not exceeding 4 oz., sent to regular subscribers, was fixed at the following quarterly rates: on those issued less frequently than once a week, 1 ct. for each issue; weekly, 5 cts.; and 5 cts. additional for each issue more frequent than once a week. The postage was required to be paid in advance either at the mailing or delivery office. These rates were repealed by the act of June, 1874, which went into force Jan. 1, 1875. The third general class of mailable matter embraces, besides transient newspapers and magazines, all pamphlets, occasional publications, unsealed circulars, books, book manuscript, proof sheets, maps, prints, engravings, articles of merchandise, seeds, cuttings, bulbs, roots, scions, and generally all articles not enumerated in other classes which are lawful matter of transmission by mail. The rate of postage in these cases, which was fixed at 1 ct. for every 2 oz. or fraction thereof by the law of 1872, and continued by that of 1874, was made 1 ct. for every ounce or fraction by the act of March 3, 1875. All articles not liable to destroy or injure the contents of a mail bag, or the person of any one in the postal service, may be transmitted by mail, if the package does not weigh more than 4 lbs.; but this limitation was abolished by the law of June, 1874, in the case of newspapers and periodicals mailed from the office of publication or a news agency to subscribers or news agents. There is no restriction as to weight in the case of documents printed by order of congress or emanating from any of the executive departments. It is unlawful to mail indecent publications, or prints, letters, or circulars concerning illegal lotteries or other unlawful enterprises, or concerning schemes intended to deceive and defraud the public for the purpose of obtaining money under false pretences. Such matter, if mailed and its character detected, must be forwarded to the dead letter office. The franking privilege, as a feature of the American postal system, has caused much discussion; efforts have been made at various times for its abolition, but without success until 1873. Formerly the right to frank letters and documents of any size was granted to the president, ex-presidents, the vice president, former vice presidents, and the widows of Presidents Harrison and Polk. Members of congress and delegates from territories, from 30 days before the commencement of each congress until the first Monday in December after the expiration of their term of office, and the secretary of the senate and the clerk of the house of representatives during their official terms, could send or receive free letters weighing not over 2 oz., or public documents weighing not over 3 lbs. The governor of any state could send free the laws, records, and documents of the legislature to the governors of other states. The cabinet officers and their assistant secretaries, the commissioners of offices and heads of bureaus, the general-in-chief and adjutant general, and the superintendent of the coast survey and his assistant, might send and receive free all official correspondence, but not their private letters or papers. The chief clerks in the departments might send free public official letters and documents. Deputy postmasters could send free all letters and packages relating exclusively to the business of their respective offices; and those whose compensation did not exceed $200 for the year ending June 30, 1846, might also send free all letters written by themselves, and receive free all letters addressed to them, not weighing over ½ oz. Exchange newspapers, magazines, &c., between editors, passed free. All publications entered for copyright, which under the act of 1846 were to be deposited in the library of congress, passed free. In 1863 the franking privilege was limited to mail matter sent to or from the president and vice president; official communications to or from the chiefs of the executive departments, and certain heads of bureaus or chief clerks, as well as to the department; correspondence to or from senators and representatives in congress (including delegates from territories), the secretary of the senate, and the clerk of the house, all printed matter issued by authority of congress, and all speeches, proceedings, and debates in congress, and all printed matter sent to them; their franking privilege to begin with their term of office, and to continue until the first Monday of December following the expiration of such term. Petitions to congress, and official communications between postmasters and (by the law of 1866) between assessors and collectors, passed free. The franking privilege was limited to packages weighing not more than 4 oz., except petitions to congress, certain public documents, and seeds, roots, &c. In January, 1871, a special report was made to congress, showing that the postage on the free matter passing through the mails would have been $2,543,328 annually. The quantity of free matter is greatly increased during times of political excitement, and has been estimated to reach in one year an amount that would have required $3,500,000 for postage. In 1873 congress abolished the franking privilege, but certain features have since been restored. By the act of June 23, 1874, which went into effect (in respect to this provision) July 1 ensuing, the postage on public documents mailed by a member of congress, the president, or the head of any executive department, was fixed at 10 cts. for every bound volume, and on unbound documents 2 cts. a pound or fraction thereof. In such cases the words "Public Document" must be written or printed on the matter, with the signature of the president, executive officer, or member of congress. By the same act the postage on each copy of the daily "Congressional Record" mailed from the city of Washington was fixed at 1 ct. By the act of March 3, 1875, the provisions above given were extended to ex-members of congress and ex-delegates for nine months after the expiration of their terms of office. This act also restored at least temporarily to members of congress the privilege of sending certain public documents free; for it provides "that public documents already printed, or ordered to be printed for the use of either house of congress, may pass free through the mails upon the frank of any member or delegate of the present congress, written by himself, until the first day of December, A. D. 1875." Under this law the "Congressional Record," or any speech or report in it, may be franked by a member of congress or a delegate. Seeds and agricultural reports may be mailed free by the commissioner of agriculture, members of congress, and delegates, and by ex-members and ex-delegates for nine months after the expiration of their terms of office. Books and other copyrighted articles, which the law of 1870 allowed to be mailed free to the librarian of congress in Washington, must now be prepaid.—By the act of March 3, 1855, the postmaster general was authorized to establish a plan for the registration of valuable letters, on the payment of a registration fee. Greater certainty in the transmission of important letters may thus be secured; but government is not liable for the loss of any registered mail matter. The number of letters registered has greatly increased since January, 1874, when the cost of registration was reduced from 15 cts. to 8 cts., in addition to the regular postage. In June, 1875, it was raised to 10 cts. The money order system was established in the

United States Nov. 1, 1864. It is intended to promote public convenience, and to secure safety in the transfer by mail of small sums of money. Security is obtained by omitting from the order the name of the payee. Information relating to the order is sent without delay by the issuing postmaster to the postmaster at the office of payment. Orders are issued for any sum not exceeding $50; a larger sum may be transferred by two or more orders; but postmasters are instructed not to issue more than three money orders for the same person in one day. The charge for issuing a money order not exceeding $10 is 5 cts.; over $10 and not exceeding $20, 10 cts.; over $20 and not exceeding $30, 15 cts.; over $30 and not exceeding $40, 20 cts.; over $40, 25 cts. The business transacted by this branch of the postal service has increased annually with marked rapidity. In 1870 there were 2,076 money order offices, from which were issued during the year 1,671,253 orders, amounting to $34,054,184. In 1874 the number of offices had increased to 3,404, the number of orders issued to 4,420,633, and the aggregate value to $74,424,854. The average amount of the orders issued was $16 83½. Only 74 orders were paid to persons not entitled to receive them. The money order system is not self-sustaining, the excess of expenditures over receipts amounting in 1874 to $77,000. To remedy this, an increase of charges for orders is recommended. The above statements relate only to domestic transactions. Postal conventions for the exchange of money orders have been concluded with Switzerland, Great Britain and Ireland, and Germany. In 1874 there were issued for Switzerland 2,721 orders, amounting to $72,287, and received from Switzerland 793, $21,222; issued for Great Britain and Ireland, 77,351, amounting to $1,491,320, and received 15,992, $303,773; issued for Germany, 35,542 orders, $701,634, and received 20,607, $535,210. The system of free delivery by carriers, adopted in 1863, has been established in 87 cities. The act of 1872 provides that carriers shall be employed for the free delivery of all mail matter in every city containing a population of 50,000, and may be employed in every city containing a population of not less than 20,000. The total number of carriers in 1874 was 2,049, the number in each city varying from 4 to 379. The amount paid to carriers, including incidentals, was $1,802,696. The railroad post office system has been widely extended since its adoption in 1864. It has been established on all important railroads, to insure the transmission of mails with the greatest rapidity, by assorting and distributing them in the cars while in motion, thus avoiding delay in local distributing offices. In 1874 the number of railroad post office lines was 63, extending over 16,414 m. of railroad and steamboat routes, on 13,271 m. of which the service is performed daily, and on 3,122 m. twice a day. There were 850 clerks employed in this service, at an annual cost of $1,058,200. By act of June 8, 1872, the postmaster general was authorized and directed to issue postal cards to the public at a cost of one cent each. The first cards were issued in May, 1873. The object of the postal card is to facilitate letter correspondence by providing for the transmission at reduced rates of short communications, either written or printed. Nearly 100,000,000 of these cards are annually used. Letters not prepaid, those not called for and which cannot be delivered, and those which cannot be forwarded on account of illegible or omitted addresses, are sent to the dead letter office in Washington, where they are opened. The writers of those containing valuables are notified, and the contents forwarded on application. Letters on which the address of the writer is written, if not deliverable, are returned unopened. In 1874 the total number of letters received at the dead letter office was 4,402,348 (4,133,928 domestic and 268,420 foreign), representing an actual or nominal value of $5,795,764, of which 1,826,108, representing $5,377,923, were delivered to owners or writers.—The expansion of the postal system of the United States is shown as follows:

YEARS.	Number of post offices.	Length of post roads in miles.	Paid for transportation.	Postal revenues.	Expenditures.
1790....	75	1,875	$22,081	$37,935	$32,140
1795....	453	13,207	75,359	160,620	117,893
1800....	903	20,817	128,644	280,804	213,904
1805....	1,558	31,070	239,635	421,373	377,367
1810....	2,300	36,406	327,966	551,684	495,969
1815....	3,000	43,748	487,779	1,043,065	748,121
1820....	4,500	72,492	782,425	1,111,927	1,160,926
1825....	5,677	94,052	785,646	1,306,525	1,229,043
1830....	8,450	115,176	1,272,156	1,919,300	1,959,109
1835....	10,770	112,774	1,553,222	3,152,376	2,585,108
1840....	13,468	155,739	3,213,042	4,543,521	4,718,235
1845....	14,183	143,940	2,898,630	4,439,841	4,320,731
1850....	18,417	178,672	2,965,786	5,499,986	5,212,953
1851....	19,796	192,026	3,538,063	6,410,604	6,278,401
1852 ...	20,901	210,020	3,939,971	6,925,971	7,108,459
1853....	22,320	217,743	4,495,968	5,940,724	7,982,756
1854....	23,548	219,935	4,630,676	6,955,586	8,557,424
1855....	24,410	227,908	5,345,238	7,352,136	9,968,342
1856....	25,565	239,642	6,035,374	7,620,821	10,407,868
1857....	26,586	242,601	6,622,046	8,053,951	11,507,670
1858....	27,977	260,603	7,795,418	8,186,792	12,721,636
1859....	28,539	260,052	9,468,757	7,968,484	14,964,493
1860....	28,498	240,594	8,808,710	9,218,067	14,874,772
1861....	*28,586	140,399	†5,309,454	9,049,296	13,606,759
1862....	*28,875	134,013	†5,853,834	9,012,549	11,125,364
1863....	*29,047	†139,598	†5,740,576	11,163,789	11,314,206
1864....	*28,878	†139,171	†5,818,469	12,438,253	12,644,786
1865....	20,550	†142,340	6,246,884	14,556,158	13,694,728
1866....	23,828	†180,921	7,630,474	14,386,986	15,352,079
1867....	25,163	203,245	9,336,286	16,137,026	19,235,483
1868....	26,481	216,928	10,266,056	16,292,600	22,730,592
1869....	27,106	223,731	10,406,501	18,344,510	23,698,131
1870....	28,492	231,232	10,884,653	19,772,220	23,998,837
1871....	30,045	238,359	11,529,395	20,037,045	24,390,104
1872....	31,863	251,398	12,572,264	21,915,426	26,658,192
1873....	33,244	256,210	13,635,341	22,996,741	29,084,945
1874....	34,294	269,097	15,402,057	24,596,568	32,126,414

From the above it appears that in recent years the cost of the postal service has greatly exceeded the income, the deficiency varying from 15 to 20 per cent. In some of the states,

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* Including suspended offices in southern states.

† Exclusive of routes in certain southern states.

however, the business yields a considerable surplus over the expenditures therein. In 1874 there was an excess of receipts in New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, and Pennsylvania, aggregating $4,308,007. The revenue from all sources for three years was as follows:

SOURCES.	1872.	1873.	1874.
Letter postage......	$345,869	$348,849	$326,295
Newspapers and pamphlets........	985,940	1,072,998	1,392,874
Emoluments........	1,086,895	1,150,042	1,226,926
Fines...............	18,617	8,917	10,711
Stamps, stamped envelopes, and postal cards...........	19,009,921	20,324,818	23,388,729
Dead letters........	7,299	6,208	8,721
Miscellaneous.......	17,451	21,325	18,124
Revenue from money orders............	448,397	68,584	105,198
Total...........	$21,915,889	$22,996,741	$26,477,071

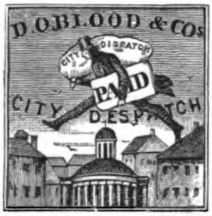
The most important items of expense were:

ITEMS.	1872.	1873.	1874.
Compensation to postmasters......	$5,121,665	$5,725,468	$5,818,472
Transportation of the mails...............	15,547,890	16,333,682	18,381,819
Clerks for post offices	2,785,258	2,978,614	3,297,961
Letter carriers......	1,385,965	1,422,990	1,802,418
Postage stamps, stamped envelopes, and postal cards...	585,828	658,921	845,196

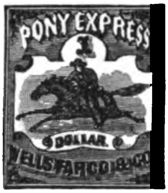
—The international postal convention which assembled at Bern, Switzerland, in September, 1874, concluded on Oct. 9 a treaty for the formation of a general postal union in which uniform rates of postage shall prevail. The countries composing the union are Austro-Hungary, Belgium, Denmark, Egypt, France, Germany, Great Britain, Greece, Italy, Luxemburg, Norway, the Netherlands, Portugal, Roumania, Russia, Servia, Spain, Sweden, Switzerland, Turkey, and the United States. The treaty was ratified, went into force on July 1, 1875, and is to continue for three years. France, however, does not join the union until Jan. 1, 1876. The rates of postage between the United States and all of these countries except Spain, the rate to which will be 12 cts. until Jan. 1, 1876, on account of French transit, are uniform and as follows: for prepaid letters, 5 cts. per 15 grammes (about ½ oz.); unpaid, 10 cts. per 15 grammes; postal cards, 2 cts. each; newspapers not exceeding 4 oz., 2 cts. each; other printed matter, samples of merchandise, &c., 2 cts. for each 2 oz. or fraction thereof. The registration fee on all correspondence is 10 cts. No fee will be charged for a return receipt in cases where a receipt from the address is requested. No additional tax will be collected in the United States on the correspondence forwarded within the union by sea on routes of more than 300 nautical miles in length. The countries forming the union constitute a single postal territory for the exchange of correspondence between their territories. The abolition of accounts for international correspondence, besides saving the expenses incident to keeping such accounts, will add largely to the postal revenues of the United States by securing the large excess of foreign postage which is annually collected in this country, and which has hitherto been accounted for and paid quarterly to the respective foreign offices. The provisions of this international arrangement are not to affect the domestic postal system of any country, or the postal arrangements between a country within and any government outside of the union. The rates adopted by the union are lower than those previously charged for the transmission of an ordinary letter between the United States and the principal countries of Europe. Thus the former postage on an ordinary letter was 6 cts. to Great Britain, 6 or 7 cts. to Germany, according to the route, 9 cts. to France, 6 or 8 cts. to Belgium, 7 cts. to Denmark, 6 or 10 cts. to Holland, 9 cts. to Sweden, 8 or 10 cts. to Switzerland, 10 cts. to Italy, 11 or 12 cts. to Spain, Portugal, or Turkey, 10 or 11 cts. to Russia, 14 or 15 cts. to Greece, and 15 or 20 cts. to Egypt. Postal conventions regulating the exchange of correspondence have also been concluded between the United States and Canada, Newfoundland, Mexico, Guatemala, San Salvador, Ecuador, Venezuela, Brazil, the Hawaiian islands, New Zealand, New South Wales, Japan, Hong Kong, the British East Indies, and the Straits Settlements. European mails are sent regularly from New York on Tuesdays, Wednesdays, Thursdays, and Saturdays of every week; from Boston on Tuesdays; from Philadelphia on Thursdays; and from Baltimore on Saturdays. There is also a weekly mail from New York for Havana, tri-monthly to Central America and the South Pacific coast, and monthly to the West Indies and Brazil; and one tri-weekly from Boston for Prince Edward island and Nova Scotia. A monthly mail goes from San Francisco to Japan, China, and the East Indies, and one to the Hawaiian islands and Australia. The postage on an ordinary letter is 5 cts. to Australia *via* San Francisco, except to New South Wales, which is 12 cts.; 15 cts. to Brazil; 3 cts. to Canada; 10 cts. to Mexico, Hong Kong (China), and the East Indies *via* San Francisco, or from 20 to 28 cts. by other routes. The rate of United States postage on letters to or from other countries, with which different rates have not been established by convention, when sent by vessels regularly employed in carrying the mails, has been fixed at 5 cts. (instead of 10) per ½ oz. or fraction thereof. Prepayment of the postage on foreign letters, whether sent to a country within or without the union, is required in the case of some countries, and optional as to others. The total number of letters exchanged in 1874 with foreign countries was 28,579,045, of which 14,885,989 were sent from and 13,698,056 received in the United States. The total cost of the United States ocean mail steamship service (including $662,500 paid from special appropriation for steamship service to Japan and China, to Brazil, and to the Hawaiian islands) was $994,844, of which $235,373 was paid for the transatlantic service.—See *Geschichte der preussischen Post*, by Henry Stephan (Berlin, 1859); "Her Majesty's Mails," by William Lewins (London, 1864); "A History of Banks for Savings," by William Lewins (London, 1866); *Notice sur l'origine du prix uniforme de la taxe des lettres* (Paris, 1872); and *Histoire de la poste aux lettres depuis ses origines les plus anciennes jusqu'à nos jours*, by Arthur de Rothschild (Paris, 1873).

POSTAGE STAMPS. The system of prepaying postage by means of small adhesive labels, to be sold to the public and received by the post office in evidence of payment when attached to letters, was first advocated by Rowland Hill in 1837, and was adopted by the British post office in 1840, the stamps being first used on May 6 of that year. They were introduced into the United States in 1847. The designs on postage stamps vary greatly with the time of issuing and the different nations that employ them. The first adhesive stamp issued by Great Britain consisted of a profile of the queen, with the word "Postage" above and the value below; but this design was objected to by many governments on account of the seeming disloyalty of the blackening (in cancellation) of the portrait of their sovereign. Brazil, the second country which adopted the system, used a simple figure of value, rather large, which was eventually superseded by a portrait of the emperor. The various German states seem to have a preference for numerals of value surrounded by inscriptions, which were at first printed in black on colored paper; but this style of printing soon gave way to the more secure plan of printing with colored ink on white paper. Many countries have adopted the national arms as the principal design of their postage stamps, and most of the stamps printed in Europe are impressed on paper watermarked with some appropriate design as an additional protection against counterfeiting. The invention of the perforating machine in England, which enabled the stamps to be more readily separated from each other, was soon adopted universally. More varieties of postage stamps have been issued, and a greater number have been in use at one time, in the United States than in any other country. Thus the total number of varieties issued is 162, while 127 have been in use at one time. Only 32 varieties have been issued by Great Britain, and 60 by France. Postage-stamp collecting, or "philately" (Gr. φίλος, loving, and ἀτέλεια, tax-free), as it is now called, began as soon as stamps were in use in half a dozen countries, and many volumes have been published on the subject. There are also special periodicals devoted to it, among which are the "American Journal of Philately," now (1875) in its 11th volume; *Le timbre poste* (Brussels); the *Briefmarken-Anzeiger* (Berlin); and "The Philatelist" (Brighton, Eng.). For a description of all postage stamps issued, see J. W. Scott's "Postage Stamp Catalogue" (New York).

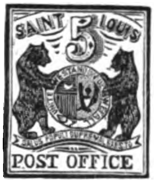
POTASH, or **Potassa**, the name usually given to the hydrated oxide of potassium (potassium hydroxide), or caustic potash. Aristotle is one of the earliest writers who mention it. He says that the Imbrians were in the habit of preparing a lye from the ashes of reeds and plants; and Pliny calls the salt made from the ashes of the oak *nitrum*. The difference between soda and potash was not recognized by the ancients. The alchemists were of the opinion that the alkali of plants was the product of combustion, the same as the gases, and it was not till 1764 that its presence in the unburned plant was shown by Marggraf. The difference between soda and potash was recognized in 1735 by Duhamel, and the presence of potash in minerals was detected in leucite by Klaproth toward the end of the last century. As soil is formed by the disintegration of rocks, the fact that plants take up the potash from the ground as nourishment soon became known, and the alkali in animals was traced to the food also indirectly derived from the soil. The importance of potash to the growth of plants and animals thus became apparent, and the study of this compound has long occupied the attention of chemists. Potassium hydroxide, or caustic potash (HKO), is of great importance in the arts, chemistry, and pharmacy, not only as the base of numerous useful salts, but for its own independent properties. It is commonly prepared from the carbonate, a solution of which in 10 to 12 parts of water is boiled with about an equal quantity of freshly slaked lime, made in a paste with water, and gradually added to the solution. The boiling is performed in a clean iron vessel, and is continued for about half an hour. The lime seizes the carbonic acid of the carbonate of potash, and leaves the hydrate of potash in solution; and the operation is found to be complete when no effervescence is observed on taking out a portion of the liquid and adding a little hydrochloric acid. It may then be drawn off in part from the calcareous sediment, and the remaining portion be recovered by filtering through a cotton filter, protected as much as possible from the air, by which it might again be partially carbonized. The clear solution is now evaporated rapidly in a polished iron or silver vessel, till it becomes of an oily consistence and hardens on cooling. Before it is allowed to cool it is usually run into cylindrical moulds, and thus is formed in sticks, which are the caustic potash or *potassa fusa* of the pharmacopœia. It contains impurities, as sulphate and carbonate of potash, chloride and peroxide of potassium, oxide of iron, and alumina, from most of which



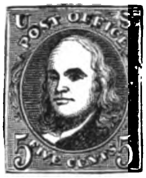
U. S. Private Stamp, 1843.



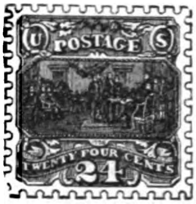
Pony Express.



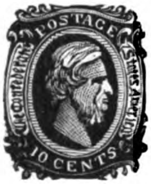
P. M. of St. Louis, 1845.



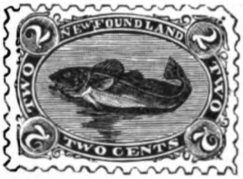
First U. S. Stamp, 1847.



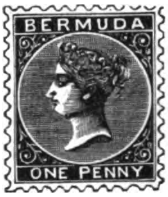
U. S., 1869.



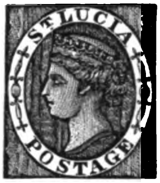
Confederate States, 1863.



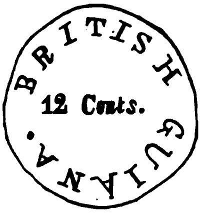
Newfoundland, 1866.

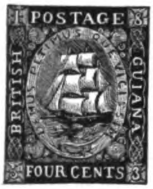


Bermuda, 1865.

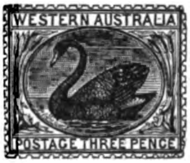


St. Lucia, 1860.

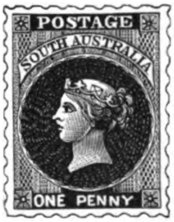

BRITISH GUIANA.
12 Cents.
British Guiana, 1850.



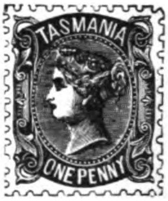
British Guiana, 1863.



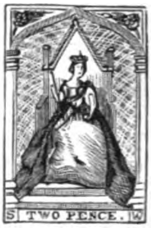
Western Australia, 1872.



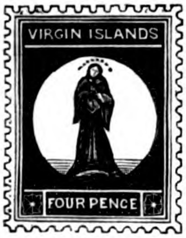
South Australia, 1855.



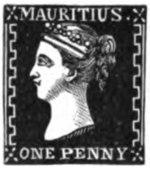
Tasmania, 1871.



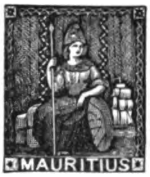
Victoria, 1857.



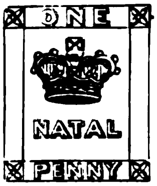
Virgin Isles, 1867.



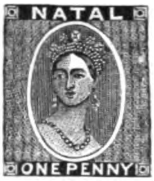
Mauritius, 1856.



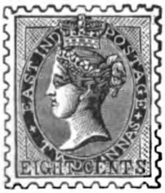
Mauritius, 1856.



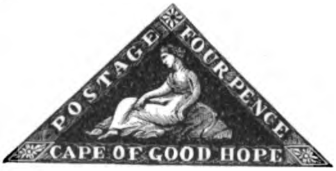
Natal, 1857.



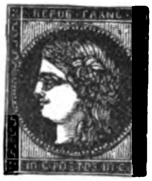
Natal, 1860.

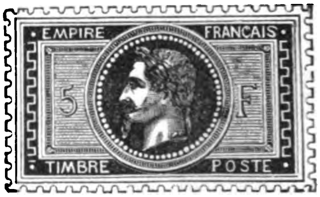


Straits Settlements, 1867.

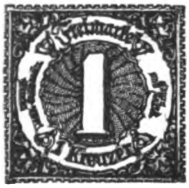


Cape of Good Hope, 1858.

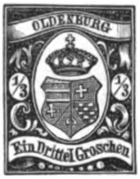

REPUB. FRANC.
France, 1849.



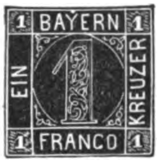
France, 1869.



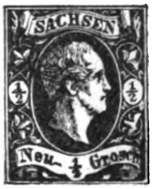
Germany, 1852.



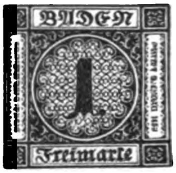
Oldenburg, 1860.



Bavaria, 1849.

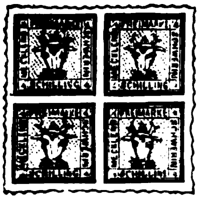


Saxony, 1851.

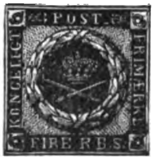


Baden, 1851.

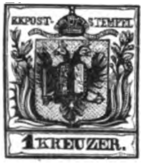
SPECIMENS OF



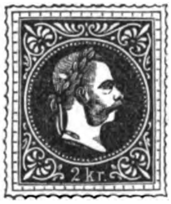
Mecklenburg, 1856.



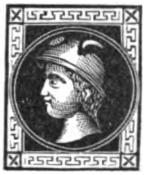
Denmark, 1851.



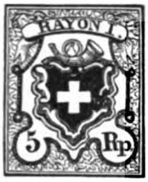
Austria, 1850.



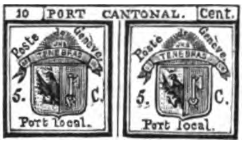
Austria, 1867.



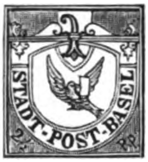
Austria, 1867.



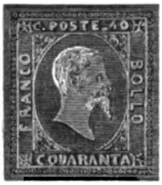
Switzerland, 1850.



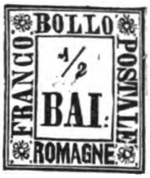
Geneva, 1844.



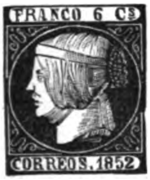
Basle, 1844.



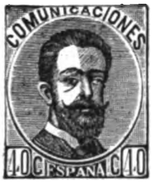
Italy, 1858.



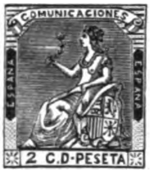
Romagna, 1859.



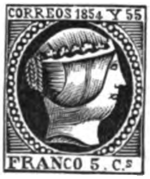
Spain, 1852.



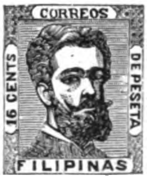
Spain, 1873.



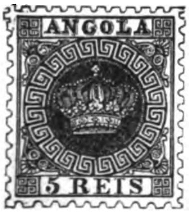
Spain, 1874.



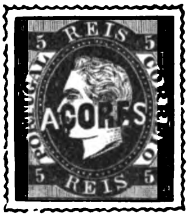
Philippine Isles, 1854.



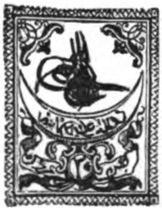
Philippine Isles, 1872.



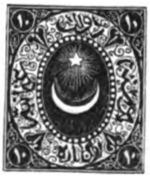
Angola, 1870.



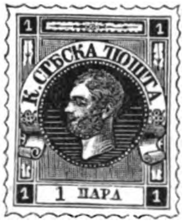
Azores, 1871.



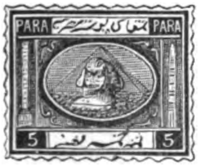
Turkey, 1863.



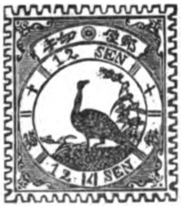
Turkey, 1865.



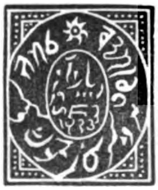
Servia, 1866.



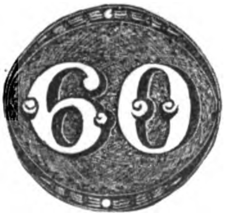
Egypt, 1867.



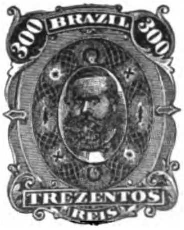
Japan, 1875.



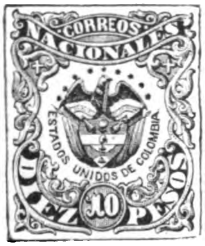
Cashmere, 1866.



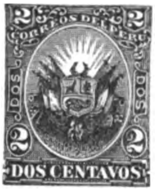
Brazil, 1848.



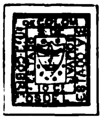
Brazil, 1871.



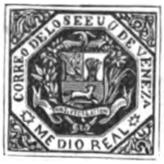
U. S. of Colombia, 1870.



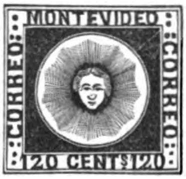
Peru, 1874.



State of Bolivar, 1868.



Venezuela, 1867.



Uruguay, 1856.

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it may be freed by dissolving in absolute alcohol, evaporating, and again fusing. Hydrate of potash may be economically separated from some feldspars and micas by calcining the minerals with lime and leaving the products for some time in contact with water; but the sources which appear likely to supersede all others are the potash minerals, such as sylvine, kainite, and carnallite, found in enormous quantities in the salt mines of Stassfurt, Germany. The explorations in one locality have developed the existence of a mass of carnallite equal to 6,000,000 tons of chloride of potassium. The pure hydrate is a white solid substance, of crystalline fracture, and specific gravity 1·7. It is very deliquescent, dissolving readily in water, the solution of specific gravity 1·68 containing 51·2 per cent. of the alkali, and boiling at 329° F. It fuses at a low red heat, and at a white heat it volatilizes without separation of the water. It has an acrid taste and corrosive action upon the cuticle, dissolving and decomposing organic tissues. It is one of the most powerful bases known, and is hence largely employed for decomposing saline compounds, the acids of which it seizes. It absorbs carbonic acid from the atmosphere, and must consequently be preserved in glass-stoppered bottles, and the glass of these must be free from lead. Mixed with the fat oils, it forms soaps; and in various other ways it is a most useful article in the arts, in chemistry, and to some extent in medicine. The pharmaceutical preparation known as *liquor potassæ* is a solution in water of the hydrate, of specific gravity about 1·05, and containing 4·7 per cent. of potassa. Its properties as an antacid, &c., are however as conveniently serviceable in the carbonate of potash. In excessive doses its poisonous action is neutralized by vinegar, the milder acids, or the oils.—Commercial potash, the crude carbonate and hydrate, is chiefly obtained from wood ashes, and is the principal portion of the soluble matters which these contain. The alkalies that exist in the soil are derived from the decomposition of different rocks and minerals. Feldspar and mica, ingredients of granite, are particularly prolific sources of potash and soda; but they cannot be made to yield these alkalies so economically as the plants, which have taken them up in their sap and hold them in a soluble state, combined with oxalic and tartaric and other vegetable acids, and also with silicic and sulphuric acids. By burning the plants, the salts of the vegetable acids are decomposed, and the potash combines with carbonic acid, remaining with the ashes as a carbonate. The ashes, moreover, contain as soluble ingredients carbonate of soda, the sulphates and silicates of potash and soda, and chlorides of the metals, including chloride of potassium; and besides these, insoluble earthy matters, which are of no value in connection with the production of the alkalies. The proportion of these two classes of ingredients varies in ashes obtained from different plants and their parts, ranging generally from $\frac{7}{10}$ to $\frac{9}{10}$ insoluble, and leaving $\frac{1}{10}$ to $\frac{3}{10}$ soluble. Berthier found the soluble portion of the ashes of oak wood to amount to 12 per cent., of white beech wood 19·22, red beech 16·3, birch wood 16, fir wood 25·7, fir charcoal 50, pine wood 13·6, wheat straw 10, and potato vines 4·2; and other chemists report the ashes of bean vines to contain 33 per cent. of soluble matter, of pea vines 27·8, of rye straw 19·47, &c. The branches and bark contain more saline matter than the solid wood, a distribution perhaps dependent on the potash existing chiefly in the sap. The stalks of tobacco, potatoes, beet leaves, tansy, sorrel, &c., contain large proportions of potash, and the removal of such products every year from the soil must cause its impoverishment, unless the potash is restored in other ways.—When ashes are treated with water a strongly alkaline solution is produced called a lye, and when this is drawn off and evaporated to dryness the soluble salts remain behind. The evaporation used to be conducted in iron pots, and hence the name potash. The manufacture is largely carried on in several wooded countries, especially where it is desirable to clear off the forests for agricultural purposes; but it appears to be northern countries alone that produce supplies for commerce. These are the northern American states and Canada, and Germany, Russia, and the other countries of the north of Europe. The method pursued in the American forests is to burn the wood in large heaps to ashes. Barrels sawed across in the middle furnish tubs, which are provided with a false bottom perforated with holes and supported upon cross sticks a little above the real bottom. Straw is laid upon the false bottom, under which is a cock for letting off the lye. The ashes mixed with about $\frac{1}{20}$ of lime are placed in the tubs and drenched with successive portions of water, which are allowed to remain for an hour or two. Those first drawn off, being saturated with the soluble salts, are conveyed directly to the evaporating pans; but the succeeding portions, being weak, are retained to use again upon fresh ashes. The pans are of iron, broad and shallow, and with corrugated bottoms to increase the heated surface. When the liquor becomes of sirupy consistence the heat is checked, and the contents of the pan soon solidify. These when cold are dug out with some difficulty and placed aside as crude potashes. They are intensely alkaline, and reddish brown from the carbonaceous matter they retain. They are afterward purified by heat on the floor of a furnace, losing most of the sulphur that may be present, the excess of water, and other volatile matters, the whole loss amounting to 10 or 15 per cent. The product is white, of a bluish or pearly cast, contains a larger proportion of carbonic acid than the crude article, and is known as pearlash. The effect of the lime added to the ashes is to decompose the sulphate of potash found among the salts of the ashes and recover the potash, while the sulphuric acid is rendered insoluble by combination with the lime, and is retained with this portion of the ashes.—Crude potash and pearlash are both somewhat variable in composition. The former contains a large proportion of hydrate of potash, which upon exposure continually lessens in quantity from absorption of carbonic acid. Pearlash is principally composed of carbonate, but contains varying proportions of caustic potash. The value of either article, as well as that of sodic hydrate and carbonate, is determined by a kind of analysis called alkalimetry. It is generally accomplished by exactly neutralizing with dilute sulphuric acid such a quantity of pure dry carbonate of the alkali as contains exactly 100 grains of real alkali. A quantity of the acid exactly equal to that used in neutralizing the 100 grains of real alkali is then further diluted till it fills a tall graduated vessel called an alkalimeter or burette, which is divided into 100 equal parts. A large quantity of acid of this strength being prepared may be readily used as a standard measure, because a volume equal to one division of the alkalimeter will exactly neutralize one grain of real alkali. The instrument may be partially filled to any number of degrees with the standard acid, and the alkali to be tested added. When the liquid is found to be neutral by the use of test paper, the impure article tested will contain as many grains of real alkali as the number of degrees of the instrument which were filled with the dilute acid. An improved form of alkalimeter has been contrived by Dr. Mohr of Coblentz, in which a tube having a small orifice is attached to the bottom, whereby the amount of liquid may be accurately regulated.

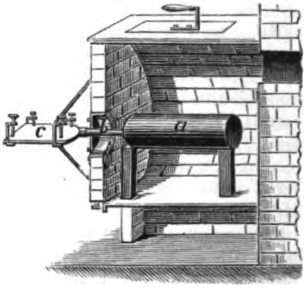


Fig. 1.—Potassium Furnace.

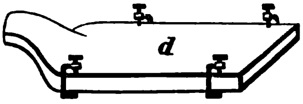


Fig. 2.—Receiver.

POTASSIUM, one of the alkali metals, discovered by Sir Humphry Davy in 1807. It had long been suspected that the alkalies and the earths were compound bodies, but up to this time all attempts to decompose them had failed. When potash was shown to be an oxide of a metal, and the metal was separated, the decomposition of the other alkalies and earths soon followed. Davy obtained potassium by subjecting a piece of moistened potassium hydroxide to the action of a powerful galvanic battery (200 Wollaston's pairs 6 in. square), the alkali being placed between a pair of platinum plates as electrodes. Gay-Lussac and Thénard in 1808 obtained it by a purely chemical process. They caused caustic potash to pass over iron turnings heated to whiteness in a gun barrel covered with clay luting to protect it from the action of the air. The oxygen of the potash combined with the iron filings, setting free the hydrogen and potassium, the latter being condensed in a well cooled copper receiver. A more recent method, invented by Curaudau and improved by Brauner, and still further by Maresca and Donné, is the one now in general use. Many precautions are necessary to insure a good result. The best material from which to obtain it is some potassium salt of a vegetable acid, the crude tartar of commerce (hydric-potassic tartrate) being usually employed. About 6 lbs. of this salt is ignited in a covered iron crucible till it ceases to emit combustible vapors, by which is produced a porous mass of potassic carbonate mingled with finely divided carbon. This is rapidly cooled by the application of cold water to the exterior of the crucible, and the charred mass is broken into lumps about the size of a hazel nut and quickly introduced into a wrought-iron retort, *a*, fig. 1, which is placed in a horizontal position in a furnace. A wrought-iron tube, *b*, about 4 in. long, conveys the vapors of potassium produced during distillation into a receiver, *c*, which is in the form of a shallow iron box, shown on a larger scale at *d*, fig. 2. This box is about 12 in. long, 5 in. wide, and ¼ in. deep between the plates, which are about ⅛ in. thick, and is open at both ends, the socket fitting upon the tube *b*. The flattened form of the receiver causes a rapid cooling of the potassium and its withdrawal from the action of the carbonic oxide which is evolved during the whole process, and has a tendency to form a dangerously explosive compound. Before adjusting the receiver the retort is slowly raised to a dull red heat, when powdered vitrified borax is sprinkled over it, forming a coating which protects it from oxidation. The heat is then increased to a reddish white, and when vapors of potassium appear and burn with a bright flame the receiver is adjusted to the tube *b*, which must not be exposed more than a quarter of an inch outside of the furnace, to avoid its being partially cooled, and the consequent formation of the explosive compound or the obstruction of the tube by solid potassium. The receiver is kept cool by a wet cloth fed with a cold water drip. If any obstruction forms, it must be immediately removed by thrusting an iron rod through the receiver and into the tube *b*. Failing in this, the fire should be immediately withdrawn. When the operation is completed, the receiver containing the potassium is detached and plunged into a vessel of rectified Persian naphtha, having a cover and kept cool by immersion in water. When cooled, the receiver may be taken apart, and the potassium detached and preserved under naphtha. When required absolutely pure, it must be redistilled in an iron retort from which the air has been expelled by the introduction of naphtha vapor. The purified metal usually amounts to about two thirds of the cruder material first taken from the receiver.—Potassium is a brilliant bluish white metal, having a specific gravity of 0·865, being the lightest of all the metals except lithium. Its symbol is K (*kalium*), and its atomic weight 39·1. It is monatomic, belonging to the group which includes the other alkali metals, cæsium, rubidinum, lithium, and sodium, together with silver. At 32° F. it is brittle, having a crystalline fracture, and at a little higher temperature it becomes malleable. At 59° it may be easily moulded; at a few degrees higher it becomes pasty, and at 144·5° it is liquid. When soft its clean surfaces may be welded together like iron, and at a red heat it distils as a beautiful green vapor. If exposed to the air at ordinary temperatures, it rapidly becomes covered with a film of oxide; and when raised to the point of volatilization it bursts into a bright violet flame. In contact with water, upon which it floats, it combines with its oxygen so powerfully as to produce sufficient heat to inflame the liberated hydrogen. The melted globule spins around upon the surface of the water, emitting a violet flame caused by the admixture of a small quantity of volatilized potassium with the hydrogen gas. A film of vapor is formed between it and the water, and the decomposition of this vapor supplies the oxygen to the burning potassium. When the melted globule of potassic hydrate formed by the combustion becomes sufficiently cooled to come into contact with the water, it is scattered with an explosive burst of steam. Potassium decomposes nearly all the gases containing oxygen when heated in contact with them, and at a high temperature will remove that element from almost all bodies containing it. At a heat a little below redness it absorbs hydrogen and is converted into a grayish hydride, from which a higher heat expels the hydrogen. It forms alloys with most other metals, the combination being generally effected by fusion. Antimonide, arsenide, and bismuthide may also be formed by heating the metals with cream of tartar.—Potassium is very widely diffused in the mineral, vegetable, and animal kingdoms. It occurs as a silicate in several minerals, particularly in feldspar (orthoclase) and mica, and is therefore an important constituent of most granitic rocks. As a sulphate it is combined with sulphate of alumina in alum stone; as chloride, bromide, and iodide, in sea water and salt deposits; and as nitrate, in various soils in tropical countries. It enters largely into the composition of the tissues and juices of land plants, especially of the grape, the apple, and other fruits, and of esculent vegetables, particularly the potato. The ashes of most forest trees abound with it. In marine plants, and in several land plants growing near the sea, the potassium is replaced by sodium; and in animals, although the tissues and fluids contain more or less potassium salts, the alkaline constituent is chiefly sodium, mostly in the form of chloride or common salt.—There are three well defined oxides of potassium: a basic or dipotassic oxide (the potash of the chemist, K_2O), which furnishes the salts of the alkali, a deutoxide (K_2O_2), and a peroxide (K_2O_4). The two latter do not form corresponding salts with acids. The dipotassic oxide is formed by allowing thin slices of metallic potassium to become oxidized in air perfectly free from moisture or carbonic acid, or by heating potassium with an equivalent quantity of hydrate (hydroxide), $KHO+K=K_2O+H$. When moistened it combines with water, with incandescence, being reconverted into hydrate. Potassic hydrate, hydroxide of potassium, or caustic potash, known in commerce as potash, is described in the preceding article. When metallic potassium is gently heated in a current of dry air, it absorbs more oxygen than at ordinary temperatures, and the peroxide is formed; and the deutoxide is formed at a certain stage of the process.—*Salts.* The salts of potassium are numerous and important. 1. Chloride of potassium, KCl (digestive salt, *sal febrifugum Sylvii*), may be formed by the spontaneous combustion of potassium in chlorine gas; also by passing chlorine over red-hot hydrate or iodide of potassium, by gently heating potassium in hydrochloric acid gas, by dissolving hydrate or carbonate of potash in aqueous hydrochloric acid, and in other ways. It occurs native, sometimes pure, as in sylvine, which is found in cubic crystals about the fumaroles of Vesuvius and in thin layers in the salt beds of Stassfurt near Magdeburg; but it is more frequently found mixed or in combination with other chlorides, in mineral waters, in kelp, and in mineral deposits. At Stassfurt it occurs not only as sylvine, but also as carnallite, a hydrated double chloride of magnesium and potassium ($KCl,MgCl_2+6H_2O$), named from its pink color, in a bed of clay lying immediately above a bed of rock salt; and it is also found in the rock salt formation of Maman in Persia. Its position with regard to the rock salt is exactly that which would result from the gradual drying up of an inland sea, the common salt, from being less soluble, crystallizing out first. Chloride of potassium crystallizes in cubes, rarely in octahedrons, composed in 100 parts of potassium 52·41 and chlorine 47·59. Its specific gravity is 1·994. It has the taste of common salt, decrepitates when heated, melts at a low red heat, and at a higher temperature volatilizes unchanged. It is sparingly soluble in alcohol. 2. Bromide of potassium, KBr. Potassium unites directly with bromine, with ignition and detonation. The salt may also be prepared by neutralizing hydrobromic acid with potash, by decomposing bromide of iron with carbonate of potash, or by adding pure bromine to caustic potash till the liquid acquires a slight yellow color, a bromate being also formed, which may be decomposed by a current of sulphuretted hydrogen gas. The excess of gas is expelled by a gentle heat, and the crystals of bromide obtained by evaporation. It crystallizes in brilliant cubes, which are sometimes elongated into prisms or flattened to plates, composed in 100 parts of potassium 32·88 and bromine 67·17; specific gravity 2·672. It has a sharp taste, decrepitates by heat, and melts without decomposition. It is very soluble in water, more so in hot than cold, and is slightly soluble in alcohol. At a red heat it is decomposed by chlorine. Bromide of potassium is an important article of the materia medica. It has of late years been largely used as a remedy for wakefulness, on account of its sedative action on the nervous system. In large doses, from 30 to 60 grains several times a day, it produces a peculiar intoxication, with torpor, drowsiness, and slowness of the pulse. Its reputed antaphrodisiac properties have been confirmed by Theilmann of St. Petersburg, Trousseau of Paris, Dr. Garrod, and others. It has been used with advantage by Sir Charles Locock in hysterical epilepsy and other nervous affections connected with uterine disorder. 3. Iodide of potassium, KI, may be prepared by several different methods, similar to those for preparing the bromide, but the best is that recommended by Liebig, which consists in decomposing iodide of barium by sulphate of potassium. The iodide of barium is prepared as follows: to 1 part of amorphous phosphorus and 40 parts of warm water there is gradually added 20 parts of dry iodine, which is triturated with the phosphorus under the water. The resulting dark brown liquid is heated on a water bath till it becomes slightly alkaline. Insoluble phosphate and soluble iodide of barium are formed, and being separated by filtration, the filtrate containing the iodide of barium is treated with sulphate of potassium. Double decomposition ensues, by which insoluble sulphate of baryta (heavy spar) and soluble iodide of potassium are formed. The iodide may then be obtained by filtration and evaporation. It crystallizes in cubes, which are translucent or milk-white and opaque, composed in 100 parts of potassium 23·54 and iodine 76·46. Sometimes it crystallizes in octahedrons. Its specific gravity is 3·056. It is not deliquescent in a moderately dry atmosphere, is very soluble in water, and in six parts of alcohol of specific gravity 0·83. It has a sharp, bitter taste, turns reddened litmus paper slightly blue, melts below a red heat, and volatilizes undecomposed at a moderate red heat. It is decomposed by chlorine with the aid of heat into chloride of potassium and iodine. An excess of chlorine causes the formation of a double salt of terchloride of iodine and chloride of potassium, which colors the liquid yellow and yields crystals by evaporation. Iodide of potassium is one of the most important agents of the materia medica. Its peculiar medicinal properties are principally conferred upon it by its iodine constituent. (See Iodine.) Its principal use is in reducing scrofulous and other tumors, in the treatment of skin diseases, of rheumatism, and of constitutional diseases, and in eliminating mineral poisons, particularly mercury and lead, from the system. Free iodine dissolves in a solution of iodide of potassium, forming, in the proportion of one part of iodine to two of the salt, Lugol's solution. 5. Phosphide of potassium, KP, is formed when phosphorus and potassium are heated together in hydrogen gas, the combination being attended with evolution of light and heat. It is decomposed by water, yielding hypophosphite of potassium, phosphuretted hydrogen gas, and solid phosphide of hydrogen. 6. Fluoride of potassium, KF, is formed by dissolving potash or its carbonate in hydrofluoric acid, evaporating, and heating strongly to expel the acid. It is deliquescent, soluble in water, and crystallizes in colorless cubes, often lengthened into prisms. It forms definite crystallizable compounds with many other fluorides. The fluoride of potassium and hydrogen, KHF_2, has been recommended by Prof. Wolcott Gibbs as a convenient reagent for decomposing refractory silicates and other minerals. 7. Potassium unites with sulphur in five different proportions, forming five sulphides, K_2S, K_2S_2, K_2S_3, K_2S_4, and K_2S_5. They all have an alkaline reaction to test paper, and an odor of sulphuretted hydrogen. Liver of sulphur (*hepar sulphuris*), prepared by heating sulphur with carbonate of potash in a covered crucible, is composed of a trisulphide, a pentasulphide, and some of the intermediate sulphides, mixed with sulphate, and often with carbonate of potash. It is a local irritant, and is used in the form of the *unguentum potassæ sulphuratæ* of the British pharmacopœia. 8. There are two carbonates of potassium, a normal or neutral carbonate, or dipotassic carbonate, K_2CO_3, and an acid salt, monopotassic carbonate, $KHCO_3$, commonly called bicarbonate of potash. The normal carbonate is prepared as follows. Commercial pearlash, known also as crude carbonate of potash (see Potash), which consists principally of carbonate, is agitated with an equal weight of cold water. The carbonate, being much more soluble than the other salts, is dissolved out. The solution is then boiled down to a small bulk and left to cool, when the carbonate separates in small crystals. A purer salt may be obtained by igniting cream of tartar in a crucible, which produces a mixture of dipotassic carbonate and charcoal (black flux). The salt is obtained by digestion in water, filtration, and evaporation. It is very soluble in water, one part of the anhydrous salt dissolving in 1·05 part of water at 37·4° F. and in 0·49 part at 158°. It contains in 100 parts 68·17 of dipotassic oxide, and 31·83 of carbonic acid; specific gravity 2·267. It crystallizes from an aqueous solution in oblique rhombic octahedral crystals, containing two equivalents of water ($K_2CO_3 + 2H_2O$), which are very deliquescent. Its reaction with test paper is strongly alkaline, and it has an acrid alkaline taste. The anhydrous salt fuses at a red heat and is partially volatilized at a high temperature. When it is heated to redness with silica, the latter unites with the oxide, forming silicate of potassium; and advantage is taken of this affinity in the analysis of mineral substances containing much silica. Dipotassic carbonate is extensively used in the arts, as in the manufacture of soap and glass, and in preparing caustic potash and other chemical compounds for the purposes of pharmacy and chemistry. The monopotassic carbonate, commonly called bicarbonate of potash, is obtained by passing carbonic acid gas into a solution of the normal carbonate in five parts of water. The bicarbonate, being much less soluble than the normal salt, is precipitated, and being collected on a filter, pressed, and redissolved in warm water, crystallizes on cooling in large rhomboidal prisms belonging to the monoclinic system, which are soluble in four parts of cold and five sixths their weight of boiling water, and are nearly insoluble in alcohol. Bicarbonate of potash is much used in chemistry when a pure potassium salt is required, and is an important article of the pharmacopœia. Its medicinal properties are similar to those of the carbonate, and being milder in its action it is generally preferred. It is used as an antacid in some forms of dyspepsia, in acute rheumatism, for which it is a standard remedy, and also in many cutaneous affections. It increases the alkalinity of the blood, and facilitates glandular secretion, for which reason it is beneficial in most forms of fever and inflammatory diseases. 9. Nitrate of potassium (nitre, saltpetre) is described in the article NITRATES. 10. The principal sulphates of potassium are a normal or neutral sulphate and an acid sulphate. Normal or bipotassic sulphate, K_2SO_4 (*nitrum vitriolatum*, *tartarus vitriolatus*, *specificum purgans Paracelsi*), occurs native in delicate needle-shaped crystals, or as a crust on many Vesuvian lavas, and in this form is often called glaserite, arcanite, aphthalose, and Vesuvian salt. It exists also in solution in sea and mineral waters, and in vegetable and animal fluids. It is obtained as a by product in several manufacturing processes, as in the manufacture of nitric acid from saltpetre, where the residue, consisting principally of acid sulphate, is neutralized with crude potassic carbonate. The hot solution on cooling yields crystals of normal sulphate, either in four-sided oblique rhombic prisms, or in six-sided pyramids, belonging to the trimetric system. They are anhydrous, require about 12 parts of water at 32° F. for solution, and are composed in 100 parts of dipotassic oxide 54·07, and sulphuric anhydride 45·93; specific gravity 2·66. They are insoluble in alcohol, and decrepitate strongly when heated. Sulphate of potash is a mild purgative, but is used in medicine principally as an ingredient of Dover's powder, or *pulvis ipecacuanhæ compositus*. The acid, or monopotassic sulphate, $KHSO_4$, commonly called bisulphate of potash, is formed by mixing the neutral sulphate with half its weight of oil of vitriol, evaporating to dryness in a platinum vessel, and dissolving the fused salt in hot water, from which it crystallizes on cooling, in flattened rhombic prisms, which dissolve in two parts of water at 60° F., and in less than one part of boiling water. It occasionally crystallizes in anhydrous needles having the formula K_2SO_4,SO_3. 11. Chlorate of potassium, or potassic chlorate, commonly called chlorate of potash, is analogous in composition to chloric acid ($HClO_3$), the difference being in the substitution of an equivalent of potassium for one of hydrogen. When chlorine gas is passed into a hot solution of potash or carbonate of potash, the liquid yields on cooling crystals of chlorate of potassium, $KClO_3$. The salt is made in this indirect way instead of adding chloric acid to potash, and precedes the formation of the acid, which is obtained by boiling the salt in a solution of hydrofluosilicic acid. It is a simple example of chemical substitution, a subject the study of which has thrown much light upon the science of chemistry. Chlorate of potash is prepared in the large way by converting milk of lime into a mixture of calcic chlorate and chloride with an excess of chlorine, and adding potassic chloride, by which the calcic chlorate is decomposed ($Ca2ClO_3 + 2KCl = 2KClO_3 + CaCl_2$). The potassic chlorate, being sparingly soluble, is easily separated from the very soluble calcic chloride by evaporation, and deposited in six-sided prisms, which being redissolved in boiling water again crystallize in six-sided plates belonging to the monoclinic system. They dissolve in about 16 parts of water at 60° F., and in about 1·6 part of boiling water. When heated, the salt gives off the whole of its oxygen, chloride of potassium remaining; a perchlorate is formed in the early stages of the decomposition. Chlorate of potash is a powerful oxidizing agent, and detonates violently when mixed with certain organic bodies and heated or struck with a hammer. If mingled with flowers of sulphur and triturated in a mortar, it produces a series of sharp detonations. It is used in the manufacture of lucifer matches, in percussion caps, and in the composition of fireworks. The following composition is applied to the interior of percussion caps: chlorate of potash 26, nitre 30, fulminate of mercury 12, sulphur 17, ground glass 14, gum 1=100 parts. Chlorate of potash is extensively used as an oxidizing agent in heightening the intensity of steam colors on printed goods, and in the chemical laboratory as a source of oxygen. (See Oxygen.) It is not adapted to the manufacture of gunpowder, as it is too violently explosive, endangering the bursting of the gun, and is also liable to become ignited by friction. (See Explosives.) It is one of the most valuable agents of the materia medica, and is employed in the treatment of scurvy, rheumatism, pseudo-membranous diseases, as croup, diphtheria, and scarlet fever, and as a prophylactic in mercurial salivation. Internally it may be given in doses of from 5 to 30 grains three or four times a day, but is generally used in much smaller quantities; as a gargle in diphtheria, from half an ounce to an ounce may be dissolved in a pint of water. 12. Several salts (phosphates of potassium) result from the union of potassium with the different forms of phosphoric acid (see Phosphorus), which are not of sufficient general interest to warrant a description.—Potassium forms important salts in combination with cyanogen (CN), and also with this radical and other elements. 13. Cyanide of potassium, KCN or KCy, is formed by burning potassium in cyanogen gas, and also when the vapor of hydrocyanic acid is passed into a cold alcoholic solution of potash; but it is usually prepared from ferrocyanide of potassium. Eight parts of this salt are mixed with three of carbonate of potash and heated to redness in a covered iron crucible. The iron constituent separates in the form of a metallic powder and settles to the bottom of the crucible, and the fused cyanide being poured off solidifies to a milk-white mass. Potassium cyanide is also produced in considerable quantities in blast furnaces in which ores are smelted with coal or coke. It crystallizes in anhydrous cubes or octahedrons, which deliquesce in the air and are very soluble in water. It is a powerful reducing agent; the oxides of many of the metals, when thrown into the melted salt, are readily reduced to the metallic state, cyanate of potassium being formed. On account of this property it is useful in removing stains of metallic oxides, as indelible ink and the juices of fruits. With many of the metallic salts it forms precipitates of cyanides, which are generally soluble in excess of potassic cyanide, forming crystallizable double salts. Thus, when it is added to a solution of nitrate of silver, cyanide of silver is precipitated, which being washed and treated with another portion of the potassic cyanide, there is formed a solution of a double cyanide of silver and potassium, $AgKCy_2$. A similar solution of gold and of other metals may be formed in the same way, and these are in common use in electroplating. (See Galvanism, vol. vii., p. 600.) 14. Ferrocyanide of potassium, potassic ferrocyanide, or yellow prussiate of potash, is an important salt, met with in commerce nearly pure, and is the source from which the cyanogen compounds are usually obtained. It may be formed by digesting ferrous hydrate in a solution of potassic cyanide; but it is made on a large scale by heating azotized matter to redness with potassic carbonate and iron. Dried refuse animal matters, as blood, horns, and parings of hides, are mixed with an equal weight of crude commercial potash, which contains sulphate of potash and about one third as much iron filings, and heated to redness in a large iron retort from which the air is excluded. The melted mass is then treated with hot water, which completes the chemical combination. The reactions by which the salt is produced are complicated. Cyanogen is first formed by the reaction of the potash and iron on the azotized matter, and the cyanogen then combines with the potassium, forming potassic cyanide. A quantity of iron is at the same time converted into sulphide from the action of potassic sulphide, which is produced by the action of the sulphate of potash contained in the crude potash. When the mass is treated with water the potassic cyanide attacks both the metallic iron and the sulphide of iron, forming potassic ferrocyanide, which is obtained from the filtered liquor by evaporation in large transparent lemon-yellow crystals, derived from an octahedron with a square base, with easy cleavage parallel to the base, having the formula $K_4FeCy_6+3H_2O$. They dissolve in four parts of cold and in two parts of boiling water, but are insoluble in alcohol. Exposed to a gentle heat, the three equivalents of water are expelled. Raised in a closed crucible to a high heat, potassic cyanide, iron carbide, nitrogen, and other gaseous products are formed. Potassic ferrocyanide is one of the most valuable of chemical reagents. With neutral or slightly acid salts of the heavy metals it forms precipitates having characteristic colors, the potassium being generally displaced by the new metal. It is not poisonous, and is sometimes used in medicine as a sedative tonic. When it is distilled with sulphuric acid, an abundance of hydrocyanic (prussic) acid is produced. It is largely used in dyeing and calico printing in connection with certain mordants upon which the color produced depends. It is used in the preparation of Prussian blue, which is the dye formed when cloth mordanted with an iron salt is treated with a solution of potassic ferrocyanide. With ferrous salts (protosalts of iron) potassic ferrocyanide produces a white precipitate of potassic-ferrous ferrocyanide ($K_2Fe_2Cy_6$), which on exposure to the air is converted into Prussian blue or ferrocyanide of iron. Prussian blue is more directly produced by adding potassic ferrocyanide to a ferric salt (per-salt or iron); a deep blue precipitate is immediately formed, consisting of ferrocyanide (Fe_7Cy_{18}), which in combination with 18 molecules of water constitutes Prussian blue. The Prussian blue of commerce is, however, prepared from the ferrous salt, the white precipitate being allowed to turn blue by exposure to the air or the action of nitric acid. The product is not pure ferric ferrocyanide, for a reaction takes place by which a potassic-ferrous ferricyanide is formed, which also has a beautiful deep blue color. When freshly precipitated Prussian blue is very bulky, but in drying it shrinks to a hard and brittle mass resembling indigo in appearance. It is quite insoluble in water and dilute acids, with the exception of oxalic acid, with which it forms a deep blue liquid, sometimes used as an ink. It is decomposed by alkalies with loss of color, the alkali combining with the ferrocyanide, ferric oxide being separated. Heated in the air it burns like tinder, leaving a residue of ferric oxide. It forms a beautiful pigment as an oil or water color, but has little permanence. It is used in medicine as a tonic, febrifuge, and alterative. It has been recommended by Dr. Zollickoffer of Maryland in intermittent and remittent fevers, as being more prompt and efficacious than quinia; and has been given by Dr. Kirchoff of Ghent with advantage in epilepsy, and by Dr. Bridges of Philadelphia in severe and protracted facial neuralgia. The dose is from three to five grains four or five times a day. 15. Ferricyanide of potassium, potassic ferricyanide, or red prussiate of potash, is an important reagent of the chemical laboratory and the calico printer. It is prepared by slowly passing chlorine gas through a dilute cool solution of potassic ferrocyanide until the liquid acquires a deep red color and ceases to precipitate a ferric salt. The reaction may be represented as follows: $2K_4FeCy_6+Cl_2=2K_3FeCy_6+2KCl$, the chlorine withdrawing one fourth of potassium from the yellow salt. It is separated from the potassic chloride by evaporation and crystallization, and is obtained pure by recrystallization in the form of transparent, anhydrous, right rhombic prisms, of a beautiful ruby red, often large. They are soluble in four parts of cold and one and a third part of boiling water; insoluble in alcohol. The salt may also be obtained by acting on the yellow prussiate by various oxidizing agents. Potassic ferricyanide, when added to a ferric salt, produces no precipitate; but with a ferrous salt it produces a deep blue precipitate of ferrous ferricyanide, which is known as Turnbull's blue. It is therefore a delicate test for a ferrous salt.—There are several organic salts of potassium, the principal of which are the tartrates, acetates, oxalates, and citrates. 16. There are two tartrates, a normal and an acid salt. The normal salt, normal potassic tartrate, or soluble tartar ($K_2C_4H_4O_6$), is prepared by neutralizing the acid salt (cream of tartar) with chalk or carbonate of potash. It is very soluble, and crystallizes with difficulty in right rhombic prisms, which are permanent in the air and have a bitter saline taste. It is used in medicine as a mild cooling purgative, sometimes combined with senna. The dose is from a drachm to an ounce. The acid salt, hydric-potassic tartrate or bitartrate of potassium ($KHC_4H_4O_6$), is described under CREAM OF TARTAR. A double tartrate of potassium and sodium is the beautiful Rochelle or Seignette salt. (See ROCHELLE SALT.) 17. There are two acetates of potassium, a normal and an acid salt. The normal salt, normal potassic acetate (*arcanum tartare*, *sal diureticus*), exists in the juices of many plants. It may be prepared by neutralizing acetic acid with potassium carbonate and heating the salt to fusion. Its formula is $KC_2H_3O_2$. It may be obtained by the double decomposition of potassic sulphate and calcic acetate. It is a white salt, of a pungent saline taste, perfectly neutral to test paper, extremely deliquescent, becoming converted into a liquid of an oily appearance on exposure to the air; it must therefore be kept in well stoppered bottles. It dissolves in about half its weight of water, and in twice its weight of alcohol. Heated above its point of fusion, it is decomposed into acetone and potassic carbonate. It is an important article of the materia medica, acting as a diuretic in doses of from 20 to 60 grains, and as a mild cathartic in two or three drachm doses. Dr. Eaton of Glasgow has found it useful in several skin diseases, as eczema and lepra; and the late Dr. Golding Bird found it remarkably efficacious in the treatment of acute rheumatism, the pain of the disease declining as soon as the urine became alkaline. The acid salt, diacetate of potassium, or acid potassic acetate, $KC_2H_3O_2$, $C_2H_4O_2$, is prepared by adding to a solution of the neutral salt an excess of acetic acid. By slow evaporation the salt crystallizes out in long flattened prisms. It is very deliquescent, melts at 298° F., and parts with one equivalent of acetic acid in a crystalline form at 392°. 18. There are two oxalates. The neutral salt, $K_2C_2O_4+2H_2O$, prepared by neutralizing oxalic acid with potassic carbonate, crystallizes in transparent rhombic prisms, which become opaque and anhydrous by heat, and dissolve in three parts of water. The acid oxalate, or binoxalate, $KC_2HO_4+2H_2O$, called also salt of sorrel, occurs in various species of *rumex*, as *R. acetosa* or common sorrel, in *oxalis acetosella* (wood sorrel), and in garden rhubarb, associated with malic acid. It is prepared by dividing a solution of oxalic acid into two equal parts, neutralizing one with potassic carbonate, and adding the other. The salt crystallizes on cooling in colorless rhombic prisms, soluble in 40 parts of cold and in 6 parts of boiling water, and has an acid reaction. A solution of salt of sorrel is often used for removing ink and fruit stains from cloth and paper. Its efficacy in removing ink depends on the solubility of the double salt, oxalate of iron and potassium, which is produced. 19. There are three citrates, tripotassic, dipotassic, and monopotassic citrate. Tripotassic citrate, citrate of potassium, or common citrate of potash, $K_3C_6H_5O_7 + H_2O$, is formed when a solution of citric acid is neutralized by potassic carbonate. On evaporation it crystallizes in transparent stellate-grouped needles, which lose their water of crystallization at 392° F. They are very deliquescent, and insoluble in alcohol. Citrate of potash is adopted as a refrigerant and diaphoretic in the United States and British pharmacopœias, and is sometimes prepared extemporaneously as an effervescent draught. Dipotassic citrate, $K_2C_6H_6O_7$, made by adding an equivalent of citric acid to the tripotassic salt and evaporating, and the monopotassic citrate, $KC_6H_7O_7$, are both acid salts, the latter crystallizing with 18·8 per cent. of water of crystallization and having an agreeable sour taste. Malate of potassium exists to a certain extent in the juice of some fruits, but malic acid more commonly exists in combination with calcium.

POTATO (Span. *batata*, the name for sweet potato, erroneously transferred to a very different plant), the plant and tuber of *solanum tuberosum*. The genus *solanum* contains over 900 described species; it includes annual and perennial herbs, shrubs, and even trees, which, though widely distributed, are more abundant in tropical South America than elsewhere; it is the typical genus of a large and important family, the *solanaceæ*, in which there are about 60 genera. Tobacco, stramonium, belladonna, and henbane are powerful narcotics belonging to the family; and besides the potato, it furnishes as esculents the tomato, egg plant, capsicum, and physalis or winter cherry. The leading characters of the genus *solanum* are a five-parted calyx; a five-lobed, wheel-shaped corolla, with scarcely any tube; stamens five with very short filaments, their anthers converging to form a cone around the pistil, each anther cell opening by a pore at the top; ovary two-celled, with a simple style, and in fruit becoming a two-celled, many-seeded berry. There are several species belonging to the tuber-bearing section, two of which, *S. Fendleri* and *S. Jamesii*, are found in the mountains of New Mexico.—The potato is one of the few generally cultivated plants that are well known in the wild state, and concerning the origin of which there is little room for discussion. There is abundant evidence that it grows wild at the present day in Peru and Chili, on the island of Chiloe, and elsewhere; it is probable that there are four or five varieties in the wild state, and not unlikely that some of those described as distinct tuber-bearing species are forms of *S. tuberosum*. The potato was carried to England in Sir Walter Raleigh's vessels from Virginia in 1586; but there is good reason to believe that it had been introduced into Spain much earlier from Quito; in 1588 it was sent to Flanders from Italy, where it had been received from Spain, and was at that time a common article of food, and was even fed to the pigs. Moreover, it is thought that its occurrence in Virginia was due to a recent introduction by the Spaniards; there is no proof that it was in cultivation by the aborigines of this country or those of Mexico. After its introduction into Europe the potato made very slow progress, and it is only within 100 years that its cultivation has been common even in Ireland, a country which since then has so largely depended upon it. In the most important gardening work of its time, published in 1771, only two varieties of the potato are mentioned, a white and a red. Though popularly called a root, the tuber of the potato is really an underground stem (see PLANT), enlarged by the accumulation of starch, which is there stored up for future use. The true nature of the tuber may be best seen by carefully taking up a young plant just as the potatoes are beginning to form; besides the proper roots there will be found stems, longer or shorter according to the variety, the ends of which and their branches have begun to swell to form tubers; usually a plant will show every gradation, from the merest swelling to well formed if not large tubers. The leaves upon these underground branches are represented by scales, often conspicuous when the tuber is young, and when it is full grown appearing as a distinct scar. In the axils of these rudimentary leaves are found the buds for next year's growth, popularly called the eyes of the potato, and these may consist of a central bud with several accessory buds on each side of it, or, in some varieties with prominent eyes, as a sort of suppressed branch with buds crowded

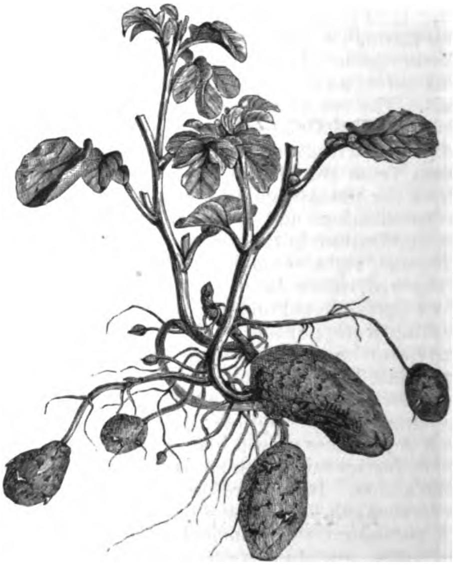


FIG. 1.—Tubers in different stages of development.

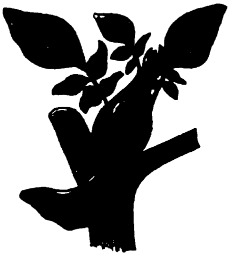


Fig. 2.—Branch developed as a Tuber.

upon it. That this is the real nature of the tuber is shown by the fact that under favorable circumstances the branches above ground will take on a similar development. As it has been cultivated for generations with a view solely to the improvement of the tubers in size and number, the other parts of the plant have diminished; in the natural state the portion of the plant above ground is large and vigorous, while the tubers are small and few; in cultivation the tuber has been developed to such an extent that the stems are comparatively weak, and many varieties do not flower and produce seeds. The vine, as it is popularly called in this country (in England the haulm), in the different cultivated kinds, presents considerable variety in size and vigor, while the leaves differ in the amount of subdivision and also in their color. The flowers in some varieties are twice as large as in others, and vary from white and bluish white to a handsome light purple; the berry, or seed ball, usually about an inch in diameter, is yellow or purplish. In common with many other solanums, the herbage and fruit of the potato contain the alkaloid solanine, an exceedingly active poisonous principle, four grains of which will kill a dog; an extract prepared by evaporating the juice of the herb has been used in medicine as a narcotic in doses of one eighth to one half grain. The foliage of the potato may be regarded as poisonous, but the dangerous principle does not exist in properly grown and carefully kept tubers; these are mainly starch, and this, wherever it occurs, or however acrid and poisonous may be the plant producing it, is always wholesome. But solanine is developed in the sprouts which form upon the tubers, and in the skin of the tuber when exposed to the light; some varieties have a tendency to form potatoes so near the surface that they become exposed by the washing away of the soil; such tubers are green where exposed, and are very acrid and unfit for food; the same thing happens when potatoes after digging are long exposed to light; any sense of acridity in the throat after eating potatoes indicates that they have been improperly kept, and should be rejected.—The potato may be multiplied in three ways: by division of the tuber, the ordinary method in cultivation; by cuttings of the stems, which take root readily in a proper propagating frame, a method sometimes resorted to for the rapid multiplication of a rare variety; and by seed. The first two processes only subdivide the individual, while from the seed new varieties are obtained; several of the newer and most valuable varieties now in cultivation, but which differ greatly in size, form, color, and time of maturing, were from the seeds contained in a single seed ball, which had been saved by the merest accident. The seeds are sown in a hotbed in February or March, and when danger of frost is over the plants are transferred to the open ground. At the end of the season the tubers are of good size and have their qualities sufficiently manifested to show whether it is worth while to give them further trial. Within the past ten years more new varieties have been produced than in all previous years. In ordinary cultivation small potatoes are planted whole; those of moderate size are cut into two or three pieces, or good-sized tubers are cut into single eyes. The first named method is habitually followed only by careless farmers; in case of scarcity of seed (as the tubers for planting are called) small refuse potatoes may be used without any perceptible change the first season, but the continuous planting of small tubers year after year tends to diminish the size of the whole crop. If a whole large tuber be planted, a few of the shoots which start first will appropriate all the nutriment, and a large proportion of the eyes will remain dormant. The object is to give each bud or eye sufficient nutriment to sustain the growth of the shoot until it forms roots. Good-sized, well formed potatoes cut to single eyes are the best; in cutting care is taken to give each eye as much of the tuber as possible. Where it is desired to make the most of a rare kind, the eyes are sometimes divided into two or three pieces; as each eye usually has several buds, this division is practicable. The end of the potato nearest to the plant is called the stem end, and the opposite the seed end; at the seed end the eyes are much more numerous than elsewhere, and, being more excitable than the others, start first. In the experiments of Dr. F. M. Hexamer of New Castle, N. Y., out of 100 potatoes planted whole, 98 started from the seed end. His experiments show that the potato, like other branches, has the power of producing adventitious buds; he peeled 70 potatoes so that no eyes were visible, and planted them in separate hills; half the number produced shoots and ripened a crop, and out of 80 hills planted with pieces without eyes, but having their portion of skin, 18 grew, and in every case the sprout started from the cut surface. When a potato is placed in sufficient heat to excite growth, but under circumstances unfavorable to the development of leafy branches, a singular transference of nutriment takes place; the starch and other principles of the old tuber, which in favorable conditions would have been expended in producing shoots, here produce new tubers; and it is not unusual to find late in spring, at the bottom of a barrel or bin where light has been completely excluded, specimens with small new potatoes attached to them. In this way gardeners sometimes produce new potatoes in winter; tubers of the preceding year's growth are kept as cool as possible, and in a dry place, with a view to retard vegetation; such sprouts as push are broken off, and in autumn the tubers thus prepared are placed in layers with light soil, in boxes, in a dark place where the temperature is from 50° to 60°; in about three months a crop of small potatoes is produced at the expense of the large ones. Occasionally a new potato, or several, are found in the interior of an old one; this is probably due to a growth similar to the one just mentioned, which takes place when the potato is so pressed upon by others that its comparatively soft interior offers less resistance to the development of the sprout or new tuber in this direction than there would be in any other.—The potato succeeds best in a temperate climate; in tropical countries it is superseded by the sweet potato, yams, and other plants, though wherever English-speaking people colonize they endeavor to cultivate the potato. The number of varieties is now very large; Dr. Hexamer, before referred to, keeps up a collection of over 300 named sorts as a standard with which to compare new varieties. The varieties so much esteemed in England do not as a general rule succeed in the United States, while American sorts were considered as not worth cultivation in England until they were tried at the gardens of the royal horticultural society and awarded first class certificates without their names or origin being known. But few of the kinds in general cultivation before the advent of the rot, in 1845, are now to be found. (See POTATO ROT.) The Rev. C. E. Goodrich of Utica, N. Y., regarding the failure of the potato as due to a weakness resulting from long cultivation by division, which not only rendered it less productive but more susceptible to diseases, commenced about 1850 a series of experiments with a view to the introduction of more vigorous varieties. He procured a fresh stock from the native localities in South America, from which he raised thousands of seedlings; his experiments in crossing and raising seedlings were continued for several years with great care, and when he produced a variety of unusual promise he sent it to various persons for trial; before he had seen the full results of his labors he died, without other reward than a few hundred dollars sent him as a testimonial. While but few of his varieties maintain a place in cultivation, most if not all the excellent kinds now grown are due to his labors. The great step in modern potato culture was the production of the early Rose, which is a seedling from one of Mr. Goodrich's very hardy and productive varieties, the garnet Chili, which has also produced other sorts of great value. The Mercer (also called Chenango and Meshannock), Carter, pink-eye, and other highly esteemed varieties of 30 or 40 years ago, are now scarcely to be found; among the leading market varieties are garnet Chili, Jackson white, peachblow, early Goodrich, and early and late Rose; while these bid fair to be superseded by a new set, in which quality and productiveness appear to have reached their utmost limits; these kinds include Alpha, Snowflake, early Vermont, Brownell's Beauty, and others of the highest excellence, and manifesting an improvement which the unselfish labors of Mr. Goodrich only rendered possible. Potatoes vary in earliness, form, size, color, the number of eyes and their elevation or depression from the surface, the smoothness or roughness of the skin, and keeping qualities; in the New York market round white-skinned varieties will sell more readily than those of different shape and color, though they may be of better quality. Bermudas are the first new potatoes that appear in our markets; they are raised from seed sent from this country; the western red and garnet Chili, both coarse kinds, grow in Bermuda in the winter, and come here in early spring; as the summer of the island is too hot for keeping them, seed potatoes are sent out annually. Following these our markets are supplied from Georgia and the Carolinas, then from Virginia, and so northward, keeping up a constant succession of new potatoes. Early potatoes may be essentially forwarded by placing the seed tubers in a warm place until they sprout, then cutting them into sets, taking care not to break the sprouts, and planting them in a frame without glass, but covered with mats or shutters at night and in cold days. As a farm crop more regard is had to productiveness and keeping qualities than to earliness; a good rich loam that has been highly manured for some previous crop, or a recently turned sod, is most suitable; the use of fresh manure, though common, is regarded as inducing rot and a bad quality of tuber; ashes, salt, and gypsum are useful fertilizers, and ground bone is much used. Potatoes are valuable for preparing new land, or that which has become weedy, for other crops; for this purpose they are planted in hills three feet or more apart each way. On land in good condition they are often planted in drills about three feet apart, the sets being dropped a foot apart in the drill. The old plan of heaping the earth around the plant, or hilling, is abandoned except in cold damp soils. The crop is kept as clean as possible, but after the tubers begin to form the culture should be very shallow. The yield of tubers is said to be increased by picking off the flower buds, though it is seldom practised. When the tubers are ripe the tops die. Numerous machines have been devised for digging potatoes, but none of them are in general use. For reasons already given potatoes should not be exposed to the sun when dug, but may be dried in small heaps covered with tops; they are stored in pits or heaps covered with sufficient straw and earth to prevent freezing, or in cellars, which should be kept at as low a temperature as possible without freezing.—The value of potatoes as food depends upon the amount of starch they contain, and this is in direct relation to their specific gravity; according to Pohl, those of sp. gr. 1·090 contain 16·38 parts of starch in 100, while those of sp. gr. 1·123 yield 24·14. The amount of starch varies with the season, unripe tubers containing scarcely two thirds as much as those thoroughly mature; and again in spring, when vegetation begins, the starch perceptibly diminishes. An average of 19 analyses by Grouven of various kinds of potatoes, freshly dug, gave water 76·00, albuminoids 2·80, starch 15·24, besides cellulose, gum, and other principles, and 0·95 of ash. The amount of ash varies from 0·88 to 1·30 in 100 parts, and this is more than half potash. As an article of food potatoes are deficient in albuminoids and phosphates, and among the Irish peasantry, where they form a large portion of the diet, the custom of eating them with buttermilk or skim milk is founded upon correct principles, as these supply the elements in which the potato is deficient. According to Smith ("Foods" in the "International Scientific Series"), "more than 2½ lbs. of potato are required to equal 1 lb. of bread in carbon, and more than 3½ lbs. in nitrogen." Tastes in regard to the quality of potatoes and methods of cooking them vary greatly; the general preference is for a dry floury ball of starch, with an absence of all flavor. The Irish boil them only so much as to leave the centre still a little hard, or "with a bone in it." Although in some parts of France potatoes are almost as largely consumed as in Ireland, the French generally do not regard them as essential to a meal, and rarely eat them plain boiled, but dressed in some of the many forms peculiar to the country; the German finds them most acceptable as a salad. Potatoes are used to some extent as a food for domestic animals, especially for swine; fed occasionally to horses, they are an excellent corrective of the digestion. Their antiscorbutic property renders them valuable on sea voyages, and they form a part of the dietary in prisons on this account. During the mining excitement in California, where men lived almost exclusively upon salt meat and fine flour, land scurvy was very prevalent, but yielded to potatoes, which met with a ready sale at $1 each, to be eaten raw. A thin slice of the potato examined with the microscope shows very large and thin cells filled with starch grains, which are about 12 in number in each cell, much larger than any others of the ordinary forms of starch, and distinctly marked with concentric lines. Potatoes are largely used in the manufacture of starch (see STARCH), and in Europe are distilled to produce spirit.—According to the census of 1870, the total production of potatoes in the United States was 143,337,478 bushels, of which New York produced 28,547,593 bushels, Pennsylvania 12,889,367, Ohio, 11,192,814, Illinois 10,944,790, Michigan 10,318,799, Maine 7,771,009, Wisconsin 6,646,129, Iowa 5,914,320, Indiana 5,399,044, Vermont 5,157,428, New Jersey 4,705,439, New Hampshire 4,515,419, Missouri 4,238,361, and Massachusetts 3,025,446.

POTATO, Sweet, a plant of the convolvulus family, variously classed by botanists as *batatas edulis*, *convolvulus batatas*, and preferably *ipomœa batatas*. It has a large edible root, creeping smooth stems, and very variable leaves; these are sometimes heart-shaped, often halberd-shaped or angled, and it is not rare to find them deeply lobed; the flower is much like that of the common morning-glory, not quite so much spreading, and of a rosy-purple color in the throat with white on the margin; it rarely produces flowers in the northern states. There is much doubt concerning the native country of the sweet potato, and there is strong evidence in favor of both its American and East Indian origin. It has not been found in the wild state in either country. Sweet potatoes were among the presents Columbus took to Isabella on his return from the new world, and the plant was in general cultivation in Spain in the middle of the 16th century; on the other hand, it is said to have been in cultivation in China and other parts of the East in very early times. It is believed that this is the potato of Shakespeare and other early English authors, and was known in Europe before the introduction of the white potato. The roots vary much in size and color, and there are several varieties in cultivation, the two most successful in northern localities being the Nansemond and Southern Queen, while in the southern states a variety known as the yam potato is regarded as one of the best. Not many years ago no one thought of cultivating the sweet potato north of Virginia, but it is now regarded as a profitable and important crop in Ohio, Illinois, and other western states, and in New Jersey in the east, and will succeed fairly in

Sweet Potato (Ipomæa batatas).

central Michigan. In the southernmost states pieces of the roots are sometimes planted, but even there the yield is better from sets or slips, a method absolutely necessary in northern localities. To procure the sets, the potatoes are laid upon the earth of a hot-bed, splitting the larger roots lengthwise and placing them with the cut side down, and covered with three or four inches of light, rich soil; sprouts soon start, and when these have made roots they are broken off to be planted, and the potatoes returned to the hot-bed to furnish more sprouts. The best method is to plant them in ridges, and this is essential to success in northern localities. The usual plan is to lay down a strip of well rotted manure and throw a furrow toward it by ploughing on each side, thus forming a ridge over the manure; other ridges are made in the same way, their tops about 3 ft. apart; after the ridges are well dressed into shape by means of the hoe and rake, the sprouts or sets are planted upon them about 15 in. apart. The after culture consists in keeping the ridges clear of weeds until the vines cover them; the vines late in the season strike root at the joints, and it is necessary in northern localities to prevent this by moving them occasionally, in order to throw all the strength into the roots. In countries where there is no frost the plant is allowed to take root at the joints, as in this manner it perpetuates itself and does not need replanting. The vines are killed by a slight frost, after which the roots should be dug at once, dried, and stored. In the southern states they are kept in piles of 30 or 40 bushels in a well drained place, and covered with leaves or straw, and finally with earth. In colder regions more care must be given; small quantities are preserved in barrels or boxes packed in perfectly dry sand, and placed in a warm cellar; on a large scale they are stored in a house, where the temperature is kept at about 60° all winter. Several plants related to the sweet potato have in their roots a purgative resin, similar to that of jalap (which is also closely allied), but this in the sweet potato is replaced by sugar and starch, though there appears to be a trace of the principle, as many persons are unable to eat them on account of the purging they produce. In this country they are used as a vegetable to be eaten with meats, while in Mexico the proportion of sugar in the root is much larger, and they are there regarded rather as a sweetmeat. Persons at the north estimate the sweet potato, as they do the common one, by the amount of starch, as indicated by its mealiness, while in southern climates the amount of sugar is the chief consideration; those which contain much sugar are never light and starchy, but, being always moist and "soggy" when cooked, would be considered by most persons at the north as unfit for food. Not many years ago the northern markets were mainly supplied from the Carolinas and Georgia, but they now come mostly from New Jersey, the soil of which is well adapted to the culture.—According to the census of 1870, the total production of sweet potatoes in the United States was 21,709,824 bushels, of which North Carolina produced 3,071,840, Georgia 2,621,522, Texas 2,188,041, Alabama 1,871,360, Mississippi 1,743,432, New Jersey 1,550,784, South Carolina 1,342,165, Tennessee 1,205,688, and Louisiana 1,023,706. Every state produced some, the fewest being 96 bushels in Vermont.

POTATO BUG, a term popularly used to designate any insect that affects the potato injuriously. There are more than a dozen such insects in the United States; but in view of its interesting history and of its being incomparably the most serious and destructive enemy of that plant, the term has come to be applied more especially to the Colorado potato beetle, originally described as *doryphora* 10-*lineata* by Thomas Say. The generic names *polygramma*, *myocoryna*, and *leptinotarsa*, applied to it by later European writers, are ignored by American authorities, as founded upon too trifling characters. This insect is indigenous to the cañons and table lands of the Rocky mountains, and began its eastern march from Colorado. In its native habitat it feeds upon various wild species of *solanum*, particularly *S. rostratum* and *S. cornutum*, peculiar to that region. As civilization advanced westward, and field and garden crops were grown within the limits of its natural range, it soon acquired the habit of feeding upon the cultivated potato. Abundance of food stimulated its prolificness, and it gradually extended its ravages eastward. The first accounts of its injurious propensities were published in 1859–'60, and within 15 years it has spread over the entire potato-growing region of the United States and Canada, and has even excited alarm in Europe. In 1861 it had advanced

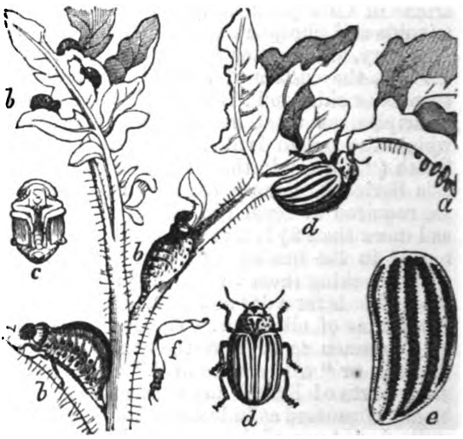


Fig. 1.—Doryphora 10-lineata.

a. Eggs. *b*, *b*, *b*. Larvæ of different sizes. *c*. Pupa. *d*, *d*. Beetle. *e*. Enlarged wing cover, showing character of punctures. *f*. Enlarged leg.

through Nebraska to the western borders of Iowa, and in the following two or three years it spread itself over the entire extent of this latter state. Its natural history was first made known in 1863, in an article published in the "Prairie Farmer" by Prof. C. V. Riley. By 1865 it had crossed the Mississippi, continuing its ravages in the potato fields of Illinois and Wisconsin. From these states, in 1867, it invaded western Indiana and the S. W. corner of Michigan, and in 1868 made its appearance in Ohio; and advancing at constantly accelerated speed, it reached the Atlantic states in 1874, and the seabord in 1875. As its native home is subalpine, it naturally thrives best in the north, and in its eastward march it has been observed that its southern columns lag far behind the northern ones. This is accounted for by the fact that the heat and drought of midsummer in the southwestern states prove inimical to it in its immature stages. This insect is not itinerant in the true sense of the word. It does not march through a country, but in every locality where it makes its advent it establishes a permanent colony. It usually proves most injurious the first year or two after its appearance. Subsequently its numbers are much reduced by the attacks of parasitic and predaceous insects which follow it, or by degrees acquire the habit of preying upon it.—The Colorado potato beetle hibernates in its perfect state beneath the surface of the ground. It has been exhumed from depths varying from a few inches to several feet, though its habit is not to burrow deeper than 10 inches. The beetles issue from the ground early in May. They fly readily during the heat of the day, and are able to make journeys of considerable extent. They begin laying their eggs upon the young potato plants as soon as the latter appear above ground, and will often work into the ground to feed upon the young leaves before these have fairly shown themselves. The eggs are oval, of a translucent dark orange color, and are deposited in clusters of from 10 to 40 on the under sides of the leaves. The larvæ are hatched in less than a week, and are at first of a dark Venetian red, becoming lighter and acquiring a double row of black lateral spots as they approach maturity. The legs, head, and posterior half of the first joint are also black. In from two to three weeks these larvæ acquire their full growth, after which they enter the earth and undergo their transformations, first to the pupa and then to the beetle state, which last is assumed in about a month from the time of hatching. There are three broods or generations each year in the latitude of St. Louis, yet it may be found at almost any time during the summer in all its different stages. This is owing to the fact that the eggs in the ovaries continue to develop, and are laid in small batches at short intervals during a period of about 40 days in summer. The number produced by a single female averages from 500 to 700. This insect, at first confined to plants belonging to the genus *solanum*, has in its eastward progress acquired the habit of feeding on several other plants belonging to different genera or even to different families; among these are the cabbage, hedge mustard (*sisymbrium officinale*), smartweed (*polygonum hydropiper*), pigweed (*amarantus retroflexus*), thistle (*cirsium*), mullein (*verbascum*), lamb's quarter, and maple-leaved goosefoot (*chenopodium album* and *C. hybridum*). But it is doubtful whether it would thrive for any length of time on any plant not belonging to the nightshade family (*solanaceæ*).—As the insect advanced toward the Atlantic, it met with new enemies at almost every step, and these are often so efficient in aiding man in his warfare against it that the farmer should be well acquainted with them. Upward of two dozen of these enemies of its own class have been enumerated and figured by Riley in his Missouri entomological reports. The only genuine parasite known to attack it is a tachina fly (*Lydella doryphora*, Riley), somewhat resembling in size and general appearance the common house fly. This fly fastens its tough, oval, white eggs to the body of the *doryphora* larva, and from them subsequently hatch small maggots, which penetrate the body of their victim, and there feeding on the fatty portions are carried into the ground when the doryphora descends to undergo its transformations, finally causing its death. These flies are sometimes so numerous about an infested potato patch that it is difficult to find an uninfected doryphora larva, and the noise they make is like the buzzing of bees. The next most efficient enemy of the Colorado potato beetle is a heteropterous insect called the spined soldier bug (*arma spinosa*, Dallas). This bug, which is equally carnivorous in its larva, pupa, and perfect states, is of an ochre-yellow color, and is represented in fig. 8 with a pair of wings closed and the

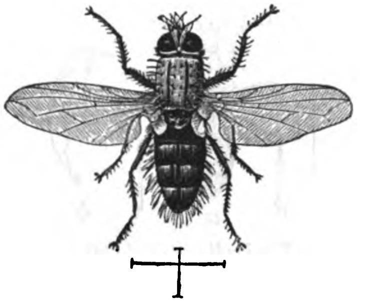


FIG. 2.—Lydella doryphora. (Hair line showing natural size.)

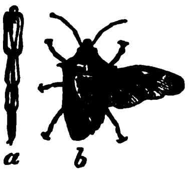


FIG. 8.—Arma spinosa. *a*. Enlarged beak. *b*. Bug, natural size, with wing extended on one side.

other extended. Its mode of attack is to thrust its long and stout beak into its victim, and, holding the latter thus impaled, to quietly drain its vital juices and throw away the empty skin.

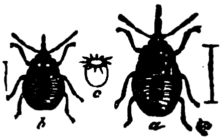


Fig. 4.—Arma spinosa.
a. Pupa. b. Larva. c. Egg, somewhat enlarged.

The eggs of this soldier bug are pretty little bronze-colored, caldron-shaped objects, with a convex lid around which radiate 15 or 16 white spines. In its adolescent stages the insect is rounded instead of angular, and more prettily colored. Of the other heteropterous insects that attack the doryphora, *strietrus fimbriatus*, *perillus circumcinctus*, *reduvius raptatorius*, and *harpactor cinctus* are worthy of note.

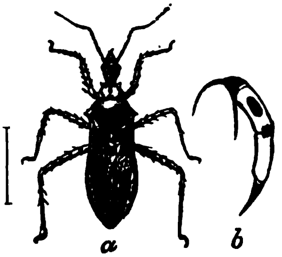


Fig. 5.—Harpactor cinctus.
a. Bug enlarged, with hair line showing natural size. b. Its beak, enlarged.

Among coleoptera or beetles, the ladybirds are the most efficient, destroying great numbers of doryphora eggs; and *hippodamia maculata*, *H. convergens*, *H.* 13-*punctata*, *H. glacialis*, *coccinella* 9-*punctata*, and *mysia* 15-*punctata* have been more particularly noticed.

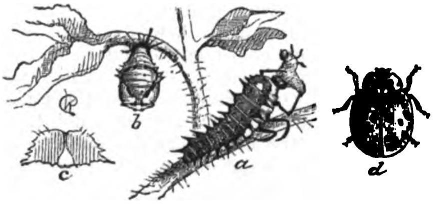


Fig. 6.—Mysia 15-punctata.
a. Larva. b. Pupa. c. Prothoracic shield of larva. d. Beetle.

Among hymenoptera, the rust-red social wasp (*polistes rubiginosus*, St. Farg.) has been seen carrying the doryphora larva to its nest as food for its young; and among diptera, some of the large asilus flies occasionally capture the beetle and suck out its juices. Among other animals which aid in reducing the numbers of the potato beetle may be mentioned the toad, and perhaps some other reptiles, the rose-breasted grosbeak, and the quail. Domestic fowls at first refused to touch either the beetle or its larvæ; but in many parts of the country they have gradually acquired the habit of feeding upon them, and may with great advantage to the grower be allowed access to the potato fields, or taught to feed upon the insects by confinement in a potato patch.—The artificial remedies against this potato beetle are varied and numerous. It is very important to kill the first beetles which appear in spring, and this can be most safely and conveniently done by aid of a pair of simple wooden pincers. During the first few years after the appearance of this insect in some of the western states, several implements were invented to facilitate its destruction. In hot dry weather most of the insects may be destroyed by knocking them off the vines, and then passing between the rows with a brush harrow drawn by a horse. But the remedy now most generally used is Paris green, mixed with from 20 to 30 parts of flour, middlings, plaster, or other diluent; or in a liquid form, using one tablespoonful to three gallons of water. Prof. Riley gives the following directions for using both the powder and the liquid: "The green may be shaken over the vines in various manners, and some persons have found an old sleazy sack, such as those used for table salt, to do good service, when attached to the end of a stick. It is most safely applied by aid of a perforated tin box attached to the end of a stick three or four feet long. The least possible dusting suffices, and by taking the handle of the dust box in the left hand, and tapping the box with a stick held in the right hand, one can walk rapidly along the rows and regulate the amount sifted. The green cannot well be mixed with the flour or plaster except by the aid of a mill, and for this reason those who mix in large quantities have the advantage. The liquid has the advantage over the powder in that there is less danger from injury in its use, and that it can be effectually used at any time of day; while the powder can be employed to advantage only while the dew is on the plants. It has, however, some disadvantages: 1, the green is not soluble, for though it quickly gives a green tint to the water when stirred, it soon settles to the bottom, unless kept in suspense by continued stirring or agitation; 2, it settles in spots on the leaves, the natural tendency of the water in finding its level being to carry and concentrate it wherever a drop finds rest and evaporates; 3, too much is wasted on the ground in the sprinkling. I have, therefore, found it much more convenient, on a small scale, to use the powder, where it can be obtained ready mixed by machinery. Applied when the dew is on the plants, it will adhere more uniformly, and it obviates the necessity of carrying about so much water. But whether the green be used in water or as a powder, the flour will prove a desirable addition, since it renders the green more adhesive, and consequently more serviceable; some care will be required in using, however, to prevent its forming lumps. This adhesive quality in the liquid may also be obtained by dissolving dextrine or gum arabic in the water—both, however, much more expensive than the flour." Much has been said against the wholesale use of Paris green for this purpose; but it is the experience of those who have had most to do with it, that there is no danger in its judicious use as here recommended. It effectually kills the insect without affecting the plant either above or below ground; and what little gets into the soil is converted into an insoluble and harmless precipitate with the oxide of iron very generally diffused.—There is another insect, known as the bogus Colorado potato beetle (*doryphora juncta*, Germar), which has always existed in the southwestern states, feeding on the wild horse nettle (*solanum Carolinense*). It is so much like the genuine beetle that it is often mistaken for it. Yet it will not touch the cultivated potato, and a close examination shows many specific differences between the two species. Compared with *D. 10-lineata*, the eggs of *D. juncta* are much paler; the larva is also paler, and has but a single row of black dots along the sides; and the beetle has the second and third lines instead of the third and fourth (counting from below) joined, and the intervening space brown; also a spot on the thighs, which is lacking in *D. 10-lineata*.

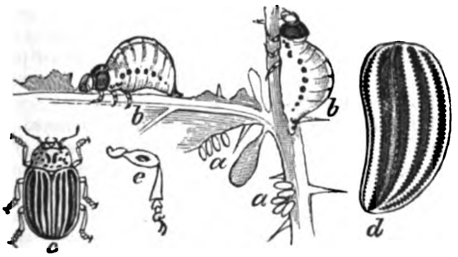


FIG. 7.—Doryphora juncta.
a, *a*. Eggs. *b*, *b*. Larvæ. *c*. Beetle. *d*. Wing cover, showing character of punctures. *e*. Enlarged leg.

POTATO FLY. See CANTHARIDES.

POTATO ROT. In 1845 the potato crop in various parts of Europe, and in the United States and British provinces, was attacked by a most destructive disease, which was called the potato murrain or potato rot. It has occurred in other years, both before and after 1845, on both continents, and to some extent in 1874; but at no time has it been so severe as in 1845. So sudden and general was the disease in that year that it caused heavy losses to farmers, and in Ireland, where the rural population depend largely upon potatoes for food, their sudden failure brought with it severe famine and distress. At first various causes were assigned for the disease, notable among which was the theory that the potato, having been multiplied for many years by the subdivision of its tubers, had become debilitated, and that the disease was due to a depraved constitution. Though this view led to the general improvement of our varieties, especially through the labors of Mr. Goodrich (see POTATO), its fallacy was long ago demonstrated, and it is known that the disease occurs in the potato in its wild state in South America. The presence of aphides or plant lice upon the tubers, and electricity and other meteorological influences, have been among the causes assigned. When the disease exists in a mild form, brown spots appear upon the herbage; after a while these spread over the plant until it dies, and the tubers will be found more or less affected; the trouble may be confined to a few plants or extend over all in a field. When it comes in its worst form the destruction is complete in a few hours, and a field that was in the morning green and flourishing will be at night a mass of rotten herbage and decaying tubers. The disease appears usually early in August and in damp weather. In 1846 the Rev. J. M. Berkeley, the eminent cryptogamic botanist of England, published his observations on the rot, and found it due to a minute fungus which, though it has been studied with great care by mycologists, still keeps a part of its history concealed, and though generally called *peronospora infestans*, there is some doubt whether it belongs to this genus. The mycelium or vegetative portion of this fungus (see FUNGI) is so small that it can find abundant room to live and spread within the tissues of the leaf, stem,

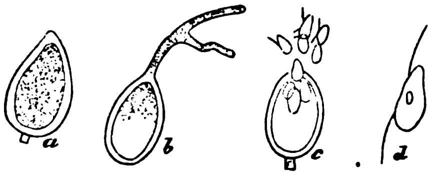


FIG. 1.—*a*. Asexual spore. *b*. The same germinating. *c*. Ejection of zoöspores. *d*. A zoöspore with cilia.

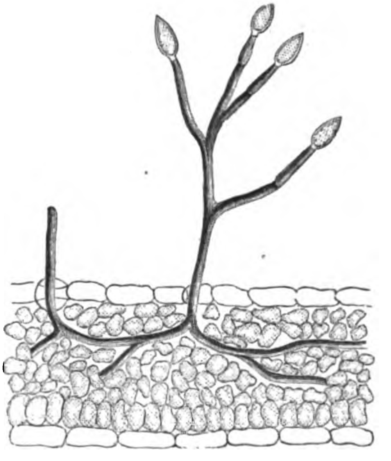


FIG. 2.—The Mycelium within the tissues of the leaf; the aërial portion bearing asexual spores. (After Farlow.)

or tuber, where it grows at the expense of the contents of the cells; it may exist to some extent within the tissues of the potato without seriously injuring the plant, and be quite unsuspected, as it can only be detected by careful microscopic observation. When from any cause the mycelium of the fungus increases so rapidly that its demand upon the potato plant for nourishment is greater than it can supply, then the plant assumes a sickly aspect, black spots appear on the leaves, and death soon follows. When the weather is cool and dry the fungus vegetates very slowly within the tissues of the potato, but warm weather accompanied by dampness favors its rapid and destructive development. The mycelium can only spread through the tissues of the particular plant it inhabits; but it produces something corresponding to seeds, by which it may be propagated from plant to plant. When fructification, as it may be called, takes place, the fungus seeks the open air; some of the threads make their way through the stomata or breathing pores of the leaf, and appear like a slight frost on its under surface; the threads often branch, and their tips and those of the branches swell up to form the egg-shaped bodies called spores, which when perfected fall away and are ready to reproduce the fungus. They germinate either by pushing out a germinal tube, or sprouting at once, or their contents undergo a change and form several small bodies (zoöspores), which to the number of 6 to 15 escape, and have the power of moving over a moist surface by means of two cilia or vibrating hairs; when these zoöspores come to rest they produce at one end a germinal tube, the same as formed by the spore; these spores or zoöspores may fall upon other plants, or may be carried there by the wind or other means, and when they germinate are able to push their germinal tube directly into their tissues and there grow to form a mycelium. These spores are asexual, being produced by the subdivision of an individual without any coöperation of two distinct plants, or two distinct organs of the same plant. They retain their germinating power for several weeks, but their vitality is destroyed by a winter's exposure. This is a brief outline of the life of this fungus so far as known, but its history is not complete; other similar fungi at some time in their career produce sexual spores or oögonia; and this may and does take place upon quite another plant. Another *peronospora*, which is very destructive to lettuce, produces on that plant only asexual spores as described for the potato fungus; but these asexual spores when they germinate on the groundsel produce a mycelium which has organs corresponding in function to stamen and pistil, and these by their union form an oögonium or sexual spore, which differs from the others in being much tougher, is not killed by freezing, and may even pass through the alimentary canal of animals and retain its vitality, and through the medium of manure be brought around to the lettuce again, when it can go on with its destructive work. This alternation of generations is very common among fungi, and botanists are now seeking for the sexual spore, or resting spore, of the potato fungus. Statements that it has already been discovered are without foundation in fact. There is some evidence pointing to clover as the plant upon which the sexual spore is produced. Prof. W. G. Farlow of the Bussey institution, Harvard university, has proposed a series of questions to cultivators to call out such evidence as may be afforded by the effect of certain rotations of crops upon the rot in potatoes.—There is no cure for the potato rot; as it does not appear until August, early varieties which ripen before that time escape it; while some more vigorous kinds seem to be better able to resist the disease than others, none are quite free from it. One of the most obvious methods of avoiding the disease is to plant only tubers that are apparently sound, although, as stated, the fungus may be within the tissues in so small quantities as to produce no rot or other manifestation of its presence. Should the suspicion that the oöspore is formed in clover be confirmed, then the avoidance of animal manures will be one of the principal means of preventing the spread of the fungus.

POTATO WORM. See HAWK MOTH.

POTEMKIN, Grigori Alexandrovitch, prince, a Russian soldier, born in the government of Smolensk in 1736 or 1739, died in October, 1791. He was an ensign in the army when in 1762, soon after the accession of Catharine II., he attracted her attention by his fine appearance. He gradually superseded Orloff as her lover, and by his influence over her became practically the arbitrary ruler of the empire. It was mainly under his influence that Turkey was crippled, and that Kherson was founded in 1778 as the chief emporium of southern Russia. He conquered the Crimea and the Kuban territory, restored the ancient names of Taurida and Caucasus, and became governor of the new possessions with the surname of Tavridtcheskoi (Tauridan), and the empress presented him with the Taurida palace at St. Petersburg, built especially for him. He dazzled Catharine with the vision of a new Byzantine empire, and when she visited him in Taurida (1787) he resorted to many stratagems to impress her with the splendor of her new dominions. (See CATHARINE II.) In the new war with Turkey he was commander-in-chief, and conquered Otchakov, while Suvaroff won victory after victory. Potemkin now thought the time had come for taking Constantinople, but the Russian exchequer was exhausted, and while he went to St. Petersburg to urge the continuation of war, Catharine concluded an armistice with the Turks. The empress had loaded him with honors and riches, and he left an immense fortune.—See *Vie de Potemkin*, by Mme. de Cérenville (Paris, 1807-'8); *Zhizn Potemkina*, by Levshin (2 vols., St. Petersburg, 1811); "Memoirs of Prince Potemkin" (London, 1814); and *Mémoires de la cour de Russie il y a cent ans*, by Prince de Ligne (1859).

POTENZA. I. A province of S. Italy, also known as Basilicata. (See BASILICATA.) II. A town, capital of the province, on the E. slope of the Apennines, 83 m. E. S. E. of Naples; pop. about 19,000. It contains old walls, a handsome cathedral of the Doric order, a royal college, and a lyceum. Cotton, woollens, leather, and earthenware are manufactured. It has repeatedly suffered from earthquakes, especially in 1857. In the middle ages it was important, but was destroyed by Frederick II. and Charles of Anjou, and never fully recovered. The remains of the ancient city of Potentia are at La Murata, in the valley below the modern town.

POTHIER, Robert Joseph, a French jurist, born in Orleans, Jan. 9, 1699, died there, March 2, 1772. He was judge successively of the court of the Châtelet in Orleans and of the *présidial*, and in 1749 professor of French law. His principal work is his *Pandectæ Justinianeæ in Novum Ordinem digestæ* (3 vols. fol., Paris and Chartres, 1748–'52). His treatise on "Maritime Contracts" has been translated by Caleb Cushing (Boston, 1821); "Contracts of Sale," by L. S. Cushing (Boston, 1839); and "The Law of Obligations or Contracts," by W. D. Evans (Philadelphia, 1840).

POTI, a fortified town of Russia, in the Caucasian government of Kutais, at the mouth of the Phasis, on the Black sea, 160 m. in a direct line W. N. W. of Tiflis, with which it is connected by rail; pop. about 7,000. The population increases rapidly despite the unhealthy climate. The lack of a safe harbor is the chief drawback. Nevertheless the foreign and coasting trade and the transit trade with Persia amounted in 1873 to about $8,000,000. The inward and outward foreign vessels (mostly Russian) number in the aggregate 893, tonnage 216,924. The principal imports are manufactured goods and tobacco; the staple exports are silk, cocoons, and wool.

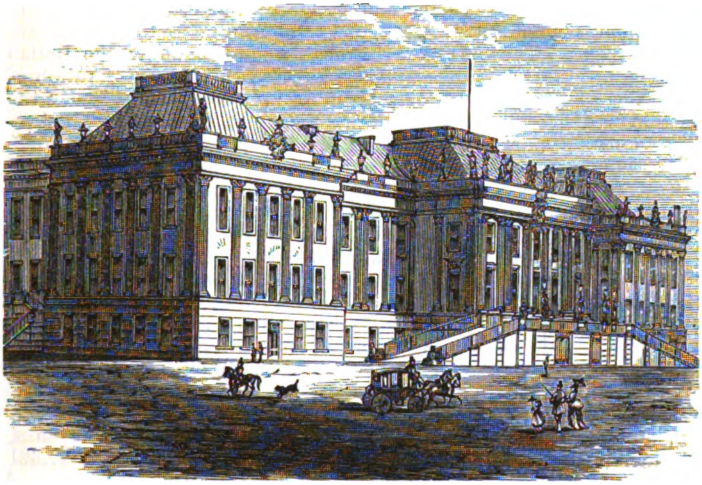
POTOCKI, a Polish family of counts, the most prominent of whom are the following. I. **Stanislaw Felix,** field marshal of the Polish artillery, born in 1745, died in 1803. He published with Rzewuski and Branicki, in 1792, the famous manifesto of the confederation of Targovitza, and was active in promoting its objects with the aid of the empress Catharine II. in 1793; but after the uprising of Poland under Kosciuszko in 1794, he took refuge in the United States, and was condemned to death as a traitor to his country. The victories of Suvaroff restored him to his native land, and Catharine made him field marshal. He passed the rest of his life principally on his estates in the Ukraine, suffering remorse for his political acts. II. **Ignacy,** grand marshal of Lithuania, cousin of the preceding, born in 1751, died in 1809. He was one of the framers of the constitution of May 3, 1791, and, when the Russian invasion took place, was obliged to flee to Prussia. The success of Kosciuszko called him back to Warsaw, where he became a member of the new government, but was captured by Suvaroff and conveyed as a state prisoner to Schlüsselburg. In 1796 he received his freedom from Paul, and went to Galicia, where he lived in retirement until the approach of Napoleon's army in 1806, when he was imprisoned a second time, but was released after a few months. III. **Stanislaw Kostka,** brother of the preceding, born in 1757, died Sept. 14, 1821. He zealously coöperated in framing the constitution of May 3, 1791, and after the second partition of Poland was arrested by order of the Austrian government. Released after some months, he devoted himself to the study of the arts, sciences, and literature. At the organization of the duchy of Warsaw in 1807, he became head of the board of education, and in 1815 was made minister of public instruction in the newly organized kingdom of Poland. He wrote "On Eloquence and Style" (4 vols., Warsaw, 1815), and on the "Art of the Ancients" (3 vols., Warsaw, 1815, unfinished), after Winckelmann. His eloquence was greatly admired. IV. **Jan,** a historian, born in 1761, died in 1815. His most important works are: *Voyage en Turquie et en Égypte fait en* 1784 (Warsaw, 1788); *Chroniques, mémoires et recherches pour servir à l'histoire de tous les peuples slaves* (1793); *Fragments historiques et géographiques sur la Scythie, la Sarmatie et les Slaves* (4 vols., Brunswick, 1796); and *Histoire primitive des peuples de la Russie* (St. Petersburg, 1802). Only 100 copies of each of these books were printed.

POTOMAC, a large river of the United States, constituting nearly the whole boundary between Maryland on the one hand and Virginia and West Virginia on the other, and formed by the junction of the North and South branches on the N. border of West Virginia. The North branch rises in the Alleghanies in the north of this state, and the South branch in the Shenandoah range on the border of Virginia and West Virginia. From the junction, which is about 20 m. S. E. of Cumberland, its course forms an irregular curve, first N. E. and then generally S. E., until it reaches the city of Washington. Thence flowing S. and S. W., it expands into an estuary from 6 to 8 m. broad, and after a course of 40 m. again changes to S. E. for about 70 m., and enters Chesapeake bay 75 m. from the Atlantic, the entire length being nearly 400 m. Its principal tributary is the Shenandoah, which enters it just W. of the Blue Ridge. Several other streams, but none of considerable size, also contribute to its volume. Of these the principal are the Savage and Monocacy rivers, and the Conegocheague, Patterson, Occoquan, and Aquia creeks, all of which are navigable for short distances. The tide extends to Georgetown, 125 m. from its mouth, and it is navigable for ships of the line to the city of Washington. From its source to tide water the river has a great descent. There are a number of falls, including Houre's, the Shenandoah, Seneca, Great, and Little; and from Westport to Washington, about 220 m., the difference in its altitude is 1,160 ft. It abounds in beautiful scenery, and its passage through the Blue Ridge at the junction of the Shenandoah at Harper's Ferry was pronounced by Jefferson one of the most stupendous scenes in nature. The navigation of this river was an early object of attention, and by the operations of the Potomac company, incorporated by Maryland and Virginia in 1784, many improvements were effected.

POTOSÍ. I. A S. W. department of Bolivia, bounded N. by Oruro, N. E. by Chuquisaca, E. by Tarija, S. by the Argentine Republic, and W. by Atacama and Peru; area, 54,297 sq. m.; pop. in 1865, 290,304, of whom about three fourths were Indians. The surface is an elevated table land, mostly rugged and mountainous, traversed by many abrupt ridges, which increase in height toward the Cerro de Potosí. This mountain is a nearly perfect cone, rising 16,000 ft. above the sea. The country is generally of volcanic formation, but this peak is an exception. It is crowned with a bed of porphyry, but its lower part is composed of a yellow argillaceous schist, filled with veins of ferruginous quartz, in which are rich deposits of silver. It seems to be the culminating point in a metallic chain which is unexcelled for richness. More than 5,000 mines have been opened in it. The top is completely honeycombed and exhausted, and the miners now work lower down, where the influx of water has compelled the abandonment of many of the richest veins. The Cerro de Porco, a little S. W. of it, is also celebrated for mineral wealth. The department is generally barren and sterile, and the mountainous parts are very cold. It is drained by several affluents of the Pilcomayo. The chief production is silver. Between 1545 and 1789 the mines of Potosí yielded $1,000,000,000 in silver, and they still give an annual yield of $2,250,000. The name signifies an eruption of silver. The mines are worked almost exclusively by Indians. Potosí produces also gold, copper, iron, lead, tin, quicksilver, zinc, antimony, manganese, cobalt, potassium, sulphur, white clay, precious stones, and other minerals. **II.** A city, capital of the department, on the N. slope of the mountain of the same name, about 13,500 ft. above the sea, 65 m. W. S. W. of Sucre; pop. in 1865, 25,774. The surrounding country is bleak and barren, and the atmosphere, except where tempered by the sun's rays, cold and piercing. It is the fourth city of Bolivia in point of population, but in the 17th century it contained 150,000 inhabitants. The greater part of the town is in ruins, but the central square, which contains the government house, public offices, a church, and a convent, is still in tolerable repair. The mint is a very large edifice, and contains the machinery which in former times did a vast amount of work, but only little over $2,000,000 is now coined annually. There are numerous churches, a college, several primary schools, and a few others for the children of the miners. The plaza of Ayacucho was constructed in honor of the battle which in 1824 decided the independence of South America, and contains a lofty cylindrical shaft surmounted by a statue of Liberty. The town is supplied with water from 37 tanks, 8 or 10 m. distant, which were constructed at great expense about 200 years ago. The country in the immediate neighborhood produces nothing. Considerable quantities of English and French manufactures are consumed there.

POTSDAM, a town and village of St. Lawrence co., New York, on Raquette river, 25 m. E. by S. of Ogdensburg; pop. of the town in 1870, 7,774; of the village, 2,891. The town is rich in agricultural resources, and contains extensive quarries of the famous Potsdam sandstone. (See SANDSTONE.) There are five post offices, viz.: Potsdam (village), Potsdam Junction (an incorporated village having 966 inhabitants in 1870, where the Rome, Watertown, and Ogdensburg, and the Ogdensburg and Lake Champlain railroads intersect), West Potsdam, Crary's Mills, and South Potsdam. Potsdam village is situated on the E. bank of Raquette river, which here furnishes abundant water power. In the spring great numbers of logs are floated down the stream, supplying the saw mills on its banks. The village has paved sidewalks, a fire department, and Holly water works. Here are the fair grounds of the Raquette valley and St. Regis valley agricultural societies. There are 42 stores, a bank, two large gang saw mills and planers, circular saw mills, two door, sash, and blind factories, an iron foundery, three machine shops, two manufactories of walnut and other mouldings, cutlery and edge-tool works, a flouring mill, two furniture factories, two planing, tonguing, and grooving works, a manufactory of carriages and farm wagons, one of agricultural implements, one of the "silver reed" organ, one of saws, chair and bedstead factories, a weekly newspaper, and six churches. The village is the seat of one of the state normal schools, which has 14 teachers and more than 500 pupils. The building is of Potsdam sandstone, three stories high with Mansard roof, and cost about $100,000.

POTSDAM, a town of Prussia, in Brandenburg, on the Havel, which here forms a small lake, 17 m. S. W. of Berlin; pop. in 1871, 43,784. It is beautifully situated, with a great variety of fine scenery. In its royal palace, begun in 1660, the rooms occupied by Frederick the Great are preserved in the same state in which he left them. His favorite residence, Sans-Souci, is near the town. It is a long low building erected in 1745-'7, and contains the apartments occupied by the king and Voltaire, as well as Frederick's clock, which was stopped at the instant of his death. Another palace in the same grounds was built after the seven years' war; and at no great distance is the beautiful villa of Charlottenhof, built in the Italian style. Other royal residences in the neighborhood of Potsdam are the marble palace, and the villa on Peacock island in the Havel. Potsdam is the capital of an administrative district of the same name. Cotton, lace, silk, linen, woollen, leather, porcelain, chemical substances, and firearms are manufactured.



Royal Palace, Potsdam.

POTT, August Friedrich, a German philologist, born at Nettelrede, near Hanover, Nov. 14, 1802. He studied in Hanover and at the university of Göttingen, and was a teacher in the gymnasium of Celle from 1825 to 1827, when he went to Berlin, where he was admitted as *Docent.* Since 1833 he has been professor of philology at Halle. He is a follower of Grimm and Wilhelm von Humboldt, and his *Etymologische Forschungen auf dem Gebiete der indogermanischen Sprachen* (2 vols., Lemgo, 1833-'6; revised ed., 4 vols., Detmold, 1867-'73) ranks next to Bopp's *Vergleichende Grammatik*, introducing a new era in comparative philology. Among his other works are: *Die Zigeuner in Europa und Asien* (2 vols., Halle, 1844-'5); *Die quinare und vigesimale Zählmethode bei Völkern aller Welttheile* (1847); *Die Personennamen, insbesondere die Familiennamen und ihre Entstehungsarten* (Leipsic, 1853; 2d ed., with an index, 1859); *Die Ungleichheit der menschlichen Rassen* (Lemgo, 1862); *Anti-Kaulen* (1863); and *Die Sprachverschiedenheiten in Europa an den Zahlen nachgewiesen* (Halle, 1868).

POTT, Percival, an English surgeon, born in London in 1713, died in 1788. He was connected with St. Bartholomew's hospital, first as assistant surgeon, and in 1749 as one of the principal surgeons. He was particularly distinguished by his valuable and original researches upon angular curvature of the spine, caused by disease and absorption of the bodies of the vertebræ, since known by the name of "Pott's disease." His principal works are: a "Treatise on Ruptures" (London, 1756); "An Account of a particular kind of Rupture, the Hernia Congenita" (1757); "Observations on Fistula Lachrymalis" (1758); "Observations on the Nature and Consequences of Wounds and Contusions of the Head," &c. (1760); "General Remarks on Fractures and Dislocations" (1768); "On the Cure of Hydrocele by Seton" (1772); "Remarks on that kind of Palsy of the Limbs which attends Curvature of the Spine" (1779); and "Further Remarks" on the same subject (1783).

POTTAWATTAMIE. I. A S. W. county of Iowa, separated from Nebraska by the Missouri river, and drained by the Boyer and West fork of the Nishnabatona, besides several large creeks; area, 960 sq. m.; pop. in 1870, 18,893. Its soil, diversified by prairie and forest, is generally fertile. It is intersected by the Burlington and Missouri River, Chicago and Northwestern, and other railroads. The chief productions in 1870 were 154,940 bushels of wheat, 611,528 of Indian corn, 88,108 of oats, 81,860 of potatoes, 200,491 lbs. of butter, and 19,326 tons of hay. There were 3,040 horses, 3,134 milch cows, 5,102 other cattle, 2,195 sheep, and 6,683 swine; 4 flour mills, 1 saw mill, 2 breweries, 3 manufactories of saddlery and harness, and 2 of cigars. Capital, Council Bluffs. **II.** A N. E. county of Kansas, bounded S. by the Kansas and W. by the Big Blue river, and watered by numerous streams; area, 851 sq. m.; pop. in 1870, 7,848. The Kansas Pacific railroad passes along the S. border. The surface is somewhat diversified, and the soil fertile. Timber grows along the streams. The chief productions in 1870 were 96,435 bushels of wheat, 468,445 of Indian corn, 112,407 of oats, 51,254 of potatoes, 14,534 lbs. of wool, 152,422 of butter, and 18,719 tons of hay. There were 3,404 horses, 3,526 milch cows, 6,035 other cattle, 3,346 sheep, and 3,451 swine; 1 flour mill, 3 saw mills, and 4 manufactories of tin ware. Capital, Louisville.

POTTAWATTAMIES, a tribe of North American Indians belonging to the great Algonquin family, and speaking one of the rudest dialects.

At the beginning of the 17th century they occupied the lower peninsula of Michigan, apparently in scattered bands, independent of each other, there being at no period of their history any trace of a general authority or government. They were hunters and fishers, cultivating a little maize, but warlike and frequently in collision with neighboring tribes. They were finally driven west by tribes of the Iroquois family, and settled on the islands and shores of Green bay, and the French established a mission among them. Perrot acquired great influence with the tribe, who soon took part with the French against the Iroquois. Onanguicé, their chief, was one of the parties to the Montreal treaty of 1701; and they actively aided the French in the subsequent wars. They gradually spread over what is now southern Michigan and upper Illinois and Indiana, a mission on the St. Joseph's being a sort of central point. The Pottawattamies joined Pontiac and surprised Fort St. Joseph, capturing Schlosser, the commandant, May 25, 1763. They were hostile to the Americans in the revolution and subsequently, but after Wayne's victory joined in the treaty of Greenville, Dec. 22, 1795. The tribe, comprising the families or clans of the Golden Carp, Frog, Crab, and Tortoise, was then composed of the St. Joseph's, Wabash, and Huron river bands, with a large scattering population generally called the Pottawattamies of the Prairie, who were a mixture of many Algonquin tribes. From 1803 to 1809 the various bands sold to the government portions of lands claimed by them, receiving money and annuities. Yet in the war of 1812 they again joined the English, influenced by Tecumseh. A new treaty of peace was made in 1815, followed rapidly by others by which their lands were almost entirely conveyed away. A large tract was assigned to them on the Missouri, and in 1838 the St. Joseph's band was carried off by troops, losing 150 out of 800 on the way by death and desertion. The whole tribe numbered then about 4,000. The St. Joseph, Wabash, and Huron bands had made progress in civilization, and were Catholics; while the Pottawattamies of the Prairie were still roving and pagan. A part of the tribe was removed with some Chippewas and Ottawas, but they eventually joined the others or disappeared. In Kansas the civilized band, with the Jesuit mission founded by De Smet and Hoecken, advanced rapidly with good schools for both sexes. A Baptist mission and school was more than once undertaken among the less tractable Prairie band, but was finally abandoned. The Kansas troubles brought difficulties for the Indians, made the Prairie band more restless, and the civilized anxious to settle. A treaty proclaimed April 19, 1862, gave individual Indians a title to their several tracts of land under certain conditions, and though delayed by the civil war, this policy was carried out in the treaty of Feb. 27, 1867. Out of the population of 2,180, 1,400 elected to become citizens and take lands in severalty, and 780 to hold lands as a tribe. Some of the Prairie band were then absent. The experiment met with varied success. Some did well and improved; others squandered their lands and their portion of the funds, and became paupers. Many of these scattered, one band even going to Mexico. In 1874 the Prairie band still under the Indian department numbered 467, on a reservation of 17,357 acres in Jackson co., Kansas, under the control of the society of Friends, who had established schools and reported some improvement. There were then 60 Pottawattamies of the Huron in Michigan on a little plot of 160 acres, with a school and log houses, 181 in Wisconsin, and 80 in Mexico or Indian territory.

POTTER, a N. county of Pennsylvania, bordering on New York; area, about 1,000 sq. m.; pop. in 1870, 11,265. It has an elevated and mountainous surface, and is drained by head waters of the Alleghany, the Genesee, and the Susquehanna. Much of it is covered by pine forests, and lumber is largely exported. The chief productions in 1870 were 22,124 bushels of wheat, 32,098 of Indian corn, 245,763 of oats, 30,701 of buckwheat, 97,621 of potatoes, 27,130 tons of hay, 52,460 lbs. of wool, 475,600 of butter, and 78,395 of maple sugar. There were 1,819 horses, 4,350 milch cows, 4,684 other cattle, 12,539 sheep, and 1,338 swine. Capital, Coudersport.

POTTER. I. Alonzo, an American bishop, born in Beekman (now La Grange), Dutchess co., N. Y., July 6, 1800, died in San Francisco, Cal., July 4, 1865. He graduated at Union college in 1818, in 1820 became a tutor there, and in 1821 professor of mathematics and natural philosophy. He was ordained to the ministry of the Protestant Episcopal church, May 1, 1822, and soon afterward married a daughter of Dr. Nott, president of the college. He was rector of St. Paul's church, Boston, from 1826 to 1831, when he became professor of moral philosophy in Union college, and in 1838 vice president of the institution. He received the degree of D. D. from Harvard and Gambier colleges, and in 1846 that of LL. D. from Union college. He was consecrated bishop of Pennsylvania, Sept. 23, 1845, and died when on a visit to the Pacific coast in search of health. His son, the Rev. Eliphalet Nott Potter, is now (1875) president of Union college. The principal publications of Bishop Potter are: "The Principles of Science applied to the Domestic and Mechanic Arts," &c. (12mo, New York, 1841); "Political Economy, its Objects, Uses, and Principles considered" (18mo, 1841); "Handbook for Readers and Students" (18mo, 1847); "Discourses, Charges, Addresses," &c. (12mo, Philadelphia, 1858); and, in conjunction with George B. Emerson, "The School and Schoolmaster" (12mo, New York, 1844).—See "Memoirs of the Life and Services of Rt. Rev. A. Potter, D. D., LL. D.," by the Rev. Dr. M. A. De Wolfe Howe (2d ed., Philadelphia, 1871).

II. Horatio, an American bishop, brother of the preceding, born in Beekman, Feb. 9, 1802. He graduated at Union college in 1826, and was ordained deacon in the Protestant Episcopal church in July, 1827, and priest the next year. In 1828 he became professor of mathematics and natural philosophy in Washington (now Trinity) college, Hartford, Conn., and in 1833 rector of St. Peter's church, Albany, N. Y. He received the degree of D. D. from Trinity college in 1838; of LL. D. from Geneva college, N. Y., in 1856; and of D. C. L. from the university of Oxford in 1860. On the death of Bishop Wainwright in 1854, Dr. Potter was chosen provisional bishop of the diocese of New York, and consecrated Nov. 22. By the death of Bishop B. T. Onderdonk, April 30, 1861, he became bishop of the diocese.

POTTER, Hazard Arnold, an American surgeon, born in Potter township, Ontario (now Yates) co., N. Y., Dec. 21, 1810, died at Geneva, N. Y., Dec. 2, 1869. He graduated M. D. at Bowdoin college in 1835, and began practice in Rhode Island, but after a residence there of a few months returned to his native place. From 1853 till his death he resided in Geneva. In 1844 he trephined the spine for depressed fracture of the arches of the fifth and sixth vertebræ, and subsequently he performed the same operation four times, twice successfully. He performed ligature of the carotid artery five times, four times successfully, removed the upper jaw six and the lower five times, and successfully removed the fifth rib on the left side from the sternum to within 3 in. of the spine, for caries of the bone accompanied by abscess in the left hypochondrium. Dr. Potter was early convinced of the safety of operations within the abdominal cavity, and in 1843 performed gastrotomy for the relief of intussusception of the bowels, with perfect success. He removed fibrous tumors of the uterus from within the abdominal cavity five times, and successfully in three cases. He extirpated by ovariotomy 22 ovarian tumors, 14 of them successfully, and in one of the successful cases both ovaries were removed at the same time. In another case, also successful, the operation was repeated upon the same patient twice with an interval of 17 months. In a case of amputation at the hip joint reported in June, 1854, proceeding as if for amputation at the upper third of the femur by flaps, he extended the external incision up to the trochanter major, and dissected out the head of the bone, by this method obtaining a large muscular stump for an artificial limb. He served as regimental surgeon of the 50th New York engineers in 1862.

POTTER, John, an English prelate, born in Wakefield, Yorkshire, in 1674, died in Lambeth, Oct. 10, 1747. He graduated at University college, Oxford, in 1692, and in 1694 was chosen fellow of Lincoln college and took orders. His edition of Plutarch's *De Audiendis Poetis* was published in 1693, and his best known work, "Antiquities of Greece," in 1697–'8. He was made D. D. in 1706, soon after chaplain in ordinary to Queen Anne, and in 1708 regius professor of divinity and canon of Christ Church, Oxford. In 1715 he became bishop of Oxford, and in 1737 archbishop of Canterbury. His theological works were collected in three volumes (Oxford, 1753).

POTTER, Louis Joseph Antoine de, a Belgian revolutionist, born in Bruges, April 26, 1786, died there, July 22, 1859. He spent his youth partly in Holland, partly in Germany, and lived from 1809 to 1811 in southern France, and in Italy till about 1824, when he returned to Brussels. He was one of the bitterest opponents of the Dutch government, and in 1828 was sentenced to 18 months' imprisonment and a fine of 1,000 florins. The people bore him in triumph to his prison, and he there wrote a pamphlet on "The Union of the Catholics and the Liberals." For other publications he was sentenced in April, 1830, to eight years' banishment. After the French revolution of July he took up his residence in Paris, and addressed a letter to the king of the Netherlands, advising him to constitute Belgium a separate state. On the breaking out of the Belgian revolution in September he returned to Brussels, where he became a member of the provisional government, and urged the establishlishment of a republic. After the dissolution of the provisional government he was obliged to flee to France, and took no further part in political affairs. The most important of his numerous works is his *Histoire philosophique du Christianisme* (8 vols., Paris, 1836–'7; abridged ed., 2 vols., 1856).

POTTER, Paul, a Dutch painter, born at Enkhuysen in 1625, died in Amsterdam, Jan. 15, 1654. He studied under his father Pieter Potter, and in his 15th year had so great a reputation that he could with difficulty supply his patrons. He was unrivalled in the painting of domestic animals, which he invariably studied from the life, making the landscape and other parts of the picture subordinate to them. Some of his best works were executed for Frederick Henry, prince of Orange. His death was the result of excessive application. His best pictures are small, exhibiting exquisite finish, a free handling, and brilliant effects of sunshine; but some are life size. Of the latter class a notable example is the picture known as the "Young Bull," now in the museum of the Hague. Of his cabinet-sized pictures one of the finest is a landscape with cattle and figures in the possession of the marquis of Westminster. Another picture representing four oxen in a meadow, which sold in 1750 for £25, was bought in 1815 by the emperor of Russia for £2,800. He executed admirable etchings.—See *Paul Potter, sa vie et ses œuvres*, by J. van Westeheene (the Hague, 1867).

POTTERS' CLAY. See Clay.

POTTERY AND PORCELAIN. The history of pottery, if it could be written, would be as old as the history of man. Baking clay and making vessels is one of the first useful arts in the history of all peoples, savage as well as civilized. Clay mingled with sand and wet with water can be moulded into almost any desired shape. Baking expels the water and fuses the sand and clay, and the result is a compact substance. This can be painted with any colors which will not change from heat, and being again baked, the forms will become decorated pottery. As this art, known as the ceramic art, affords opportunity for the modeller and the painter, and as it has been practised by all nations in all times, it furnishes the most important illustrations of the taste, education, and comparative civilization of different peoples; and inasmuch as its result, pottery, is among the most indestructible materials known, and as pictures, names, stamps, and records of various kinds are frequently placed upon articles of it, it becomes of the highest importance as a historic art. Still more, as in all nations where civilization has reached a high grade the best artists have often been employed in the decoration of pottery and porcelain, as well as the best modellers in producing forms of beauty, thus uniting the work of painter and sculptor, the art takes high rank among the fine arts. Hence great attention has been paid to it by archæologists and by lovers of the beautiful. Vast public and private collections have been made illustrating its history, and very high prices have been paid for rare specimens of peculiar historical or artistic quality. —With the clay of which pottery is composed, sand, chalk, and other substances may be mingled, and thus different varieties produced. The color of simple pottery depends on the ingredients of the clay. Pottery is of two kinds, soft and hard. Soft pottery yields easily to the point of a knife, while hard resists it. Soft pottery melts at a much lower temperature of the furnace than hard. A common building brick is the simplest illustration of soft pottery, while a fire brick is the simplest illustration of hard pottery. Soft pottery is usually divided in the study of ceramic art into four classes: 1, unglazed pottery, the result of baking clay without surface varnish or glaze; 2, lustrous pottery, a name applied to a large class of objects which have a shining surface produced by a thin varnish or coating which reflects light, but which is sometimes permeable to water; 3, glazed pottery, which is covered with a thick shining surface produced by the use of lead, or by the union of alkaline substances with lead in the clay; 4, enamelled pottery, covered with a coating of enamel in which tin is employed (whence the word stanniferous), and which being baked receives a surface decoration, of different substance from the pottery and more or less thick, which is of vitreous character, resisting acids and not permeable to water. The larger part of all ancient pottery is included in the first three classes. Most modern pottery, including Saracen, Italian, French, German, Dutch, and other ware, known as majolica and fayence, is soft pottery enamelled. Fayence is a term derived from Faenza, an Italian city where decorated pottery was largely made in the 16th century, and in its present general use includes all pottery enamelled or decorated with color. The French formerly used the word *faïence* as including all pottery and porcelain, but the more modern French usage applies it to pottery only. Majolica is a word supposed to be derived from Majorca, where Saracen pottery was made, and is used to signify all fayence of Italian manufacture. Lately the word has been used as almost if not quite synonymous with fayence. The term "ceramic" includes all works in pottery, porcelain, and stoneware, and is derived from the Greek *κέραμος*, signifying potters' clay, earthen vase, &c. Porcelain is a product of clay and sand, like pottery, but the clay is of a class which with the addition of other substances produces a translucent body. Pottery is always opaque, porcelain always translucent. Pottery breaks with a rough fracture, exhibiting the color of the clay; porcelain breaks with a vitreous fracture, white and clean. Porcelain is divided into two classes, soft paste and hard paste. Soft paste porcelain is made of fine clay, mingled in large proportions with silex and other substances. As the proportion of silex is increased the soft paste porcelain approximates more nearly to glass, and the products of some factories have been but little different from opaque glass. Different pastes have been used by different makers. About 1840 Staffordshire soft paste porcelain was composed of Cornish kaolin 31, Cornish china stone 26, flint 2·5, and bones 40·5 per cent. Hard paste, called "true porcelain," depends for its manufacture on the use of a peculiar clay which the Chinese called *kaolin*, the name by which it is now known, and which is mingled with feldspar (called in China *petuntse*). All Chinese porcelain and much of the European is hard paste. Soft paste porcelain can be distinguished from hard paste by its more readily yielding to an iron point, by its oily feeling to the touch, and by the general fact that articles of soft paste are glazed throughout, while articles of hard paste show unglazed bottoms or bottom rims. A third kind of ware, occupying a place midway between pottery and porcelain, is known as stoneware. It is in fact a very hard pottery, and is composed of the same substances, with divers additions varying in different factories.—*History of Pottery.* The oldest pottery known is Egyptian. The tombs at Beni Hassan in Egypt, which date from about 2000 B. C., contain pictures of various Egyptian trades and industries, including a pottery, in which appears the potter's wheel in use for forming cups. The Egyptians therefore made soft pottery in forms at this early period. They possessed also an art which belongs to the class of pottery, though not actually the baking of clay. They carved small articles from steatite or soapstone, which they covered with a vitreous substance and baked in furnaces, producing a resemblance to enamelled pottery. This art was of very early origin, and specimens are known bearing the names of kings who reigned before 2000 B. C. The Egyptians also had knowledge from an early period of the art of enamelling pottery. No chemical analysis has yet been made of their enamel, but it resembles the stanniferous enamel of modern times. They used colors with this enamel, producing pure white, yellow, purple, and green objects, and especially a blue which was very rich and pure, and has never been surpassed. Articles enamelled in blue 15 centuries B. C. are as bright and perfect to-day as articles of modern production. They made vases, cups, amulets of many kinds, and especially figures of the Egyptian pantheon, which were exquisite in model, and rank as works of high art. When Egypt fell under Greek domination, the pottery for the first time in 15 centuries began to show indications of foreign influence; and in the Roman period Egypt produced only such pottery as the Romans everywhere made.—In the Euphrates valley pottery was made from the earliest dates. The expression in Genesis xi. 3, "Go to, let us make brick and burn them thoroughly," shows a knowledge of the art, which must have included other articles than brick, but we have no relics of this early period. The ruins of Babylon and Nineveh abound however in remains of brick walls, and these bricks were often covered with a stanniferous enamel. This art was probably learned from Egypt. The most remarkable use of pottery in the valleys of the Euphrates and Tigris was as a method of perpetuating records. Many thousands of specimens have been discovered which show that even the most ordinary transactions, the conveyance of land and of slaves, were recorded on tablets of wet clay, baked, and thus rendered permanent. History, fable, poetry, and a vast amount of literature were thus recorded, and modern learning is fast deciphering and translating these curious and interesting relics. At a later period it was the custom to make coffins of pottery, unglazed and enamelled, with more or less decoration. At Warka vast numbers of these coffins have been found. Very few vases or articles of ordinary use have been discovered, and we have but slight knowledge of the taste and skill of the Assyrians in ornamental pottery. They built walls of cities and of palaces with brick, and enamelled the surfaces in brilliant colors.—The ceramic art probably went eastward as well as westward from the Euphrates valley. Eastward we cannot trace its course, except as possibly the Chinese derived it from them. West of the Euphrates we find it in Phœnicia, whence it went by different routes across the archipelago to Greece. With Phœnician art the modern world has been little acquainted until the discoveries made by Gen. di Cesnola in Cyprus (see Cesnola), the results of which are in the Cesnola collection in the metropolitan museum of art in New York. The Phœnicians appear to have possessed the art at a period prior to 1500 B. C. Their products of that time consist of rude images of Venus, and unglazed pottery wares of great variety in form, but without interest in decoration. As the predecessors of the finest works of Greek ceramics, the Phœnician relics possess great interest. The first decoration was in lines scratched or in color, circles, zigzags, simple geometric figures, chequers, &c. At an early period a glaze or lustre was invented which gave brilliancy to the surface. It is so thin that it has defied chemical analysis, and its composition is unknown. On this the same simple forms of decoration were first used. When Egypt conquered Cyprus, Egyptian influences began to reach the Phœnician work on this and other islands of the archipelago. The lotus flower, birds in deep red and black colors, and at length various animals, were painted on the vases. Prior to 700 B. C. no attempt is made to divide Greek pottery into classes. The works which are painted in white, black, and red, with rows of tigers, goats, lions, &c., around the piece, or with lotus flowers, birds, &c., have been variously called Doric, Corinthian, Carthaginian, Phœnician, and Egyptian. The Cesnola discoveries show them to be Phœnician modified by Egyptian influence, and properly

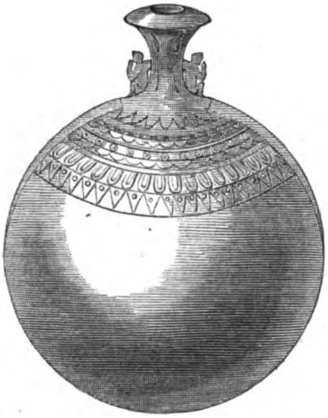


Fig. 1.—Egyptian Aryballos.

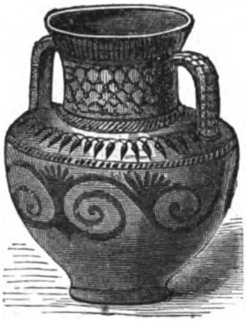


Fig. 2.—Phœnician Vase, from the Cesnola Collection.

styled Egypto-Phœnician. The human form was seldom painted on the earlier pottery, but about 600 B. C. the second style came into use, in which the articles were painted black, leaving open spaces showing the original surface color of the clay, generally red or yellow, on which figures in black were painted. This was the commencement of fine art, and improved for two centuries. Vast numbers of vases and other articles were now made, on which there were paintings representing scenes from history, from the cyclic poets, from mythology, and from the imagination of the artists. The next advance consisted in adopting the red or yellow surface of the clay for the picture, painting the rest of the article black. The red figures, touched with lines in black, had expression and action, and the art had reached its culmination. The best period was from 400 to 300 B. C. After the latter date the art declined, and before the days of the Romon empire was practically abandoned.—The Greeks imported into Italy both the splendid works of their potteries and the potters themselves, who produced similar fabrics in that country. For a long time these works were attributed to the Etruscans, but it is now known that the Etruscans never excelled in ceramic art. They made rude pottery in their earlier periods, then learned some ideas from the Greeks, and produced poor imitations of Greek work. The Romans made immense quantities of pottery for useful purposes. Bricks and tiles for draining, for walls, for roofs, and for other uses, were a great source of revenue to land owners and to potters. These had inscriptions giving the name of the owner from whose land the clay was obtained and the name of the maker, and they often bear names of consuls, dates, and other important historical inscriptions. A common mode of Roman burial was in a grave lined with tiles, the body being preserved from contact with the earth by arched tiles over it, on which are often found inscriptions. Large pottery statues, as well as statuettes, abounded in Rome in early times. The most interesting articles of Roman pottery which are preserved to us are lamps in great variety of form and decoration, generally made in moulds. The Romans also made a variety of pottery known as Samian ware, from its resemblance to the Greek pottery of Samos. This was of a brilliant red, often pressed in moulds so as to give decoration in raised work. This ware was made wherever the Roman power extended.—In the later period of the Roman empire the ceramic art fell into disuse, and all knowledge of its artistic capabilities was lost. But the art, which had probably passed from the Euphrates valley into the eastern parts of Asia, and had been practised in China and India from a very early period, seems to have found its way back across Asia at the time when Europe was losing it. The Saracens possessed it as early as the 8th century, although we cannot identify specimens of their work until a later time. Europe is indebted to them for its revival, as it is for that of other fine arts. They found it useful for their peculiar and beautiful architecture, and made tiles for internal and external use in public and private buildings. As early as the 12th century they excelled in the use of stanniferous enamel with brilliant colors. They carried the art into Spain, where it produced tiles called *asulejos*, and dishes and vases in what has been called the Hispano-Moresque style. Their decorations were exceedingly fine, abounding in arabesques on brilliant blue, green, red, yel-

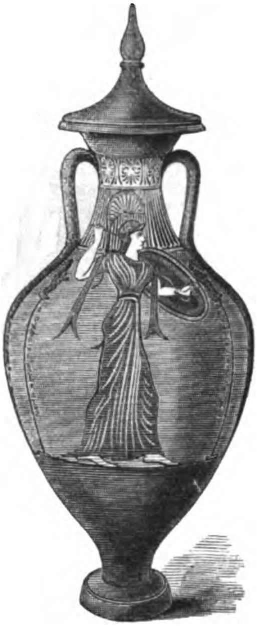


FIG. 3.—Greek Prize Vase.

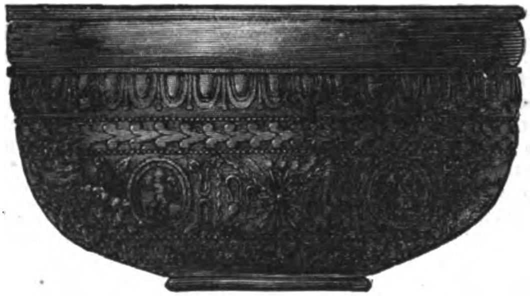


FIG. 4.—Roman Bowl of Samian Ware.

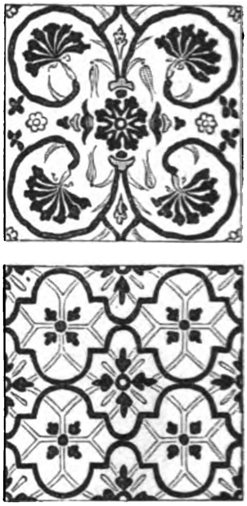


FIG. 5.—Saracen Arabesque Tiles.

low, and white enamel. Whether Germany derived knowledge of the art from Saracen sources it is impossible to affirm, but the first work in glazed pottery in Christian Europe of which we have any knowledge is found at Leipsic, where the convent of St. Paul, finished in 1207, had a frieze of glazed or enamelled bricks, with raised figures of Christ and the apostles. At Breslau, in the Kreuzkirche, the monument of Henry IV. of Silesia (who died in 1290) is a great work in enamelled or glazed pottery, including a life-size figure of the duke. But these are isolated examples, and the art does not seem to have survived in Germany. Nor is it altogether certain whether these works are glazed or true enamelled pottery. In Italy, after the decay of the Roman empire, pottery was made in rude forms until the 13th century, when we know that wares were produced covered with a lead glaze and decorated with colors. This glaze, fusing with the colors, produced a peculiar mingling in the surface decoration, and the ware is known as *mezza majolica*. Luca della Robbia of Florence, born about 1400, acquired the art of covering pottery with a stanniferous enamel, long practised by the Saracens in Majorca, and in 1438 produced and placed in the Duomo at Florence his first work, the "Resurrection," consisting of a plaque having a blue ground, on which are raised figures in white. From this commencement is dated the origin of the best art in Europe. Luca taught the art to his nephew Andrea. The latter in turn left four sons, one of whom, Girolamo, went to Paris and worked and died there, having survived his brothers. With him the secrets of the Della Robbia family perished; but the great secret of stanniferous enamel had become known. During the 15th century Italian potters continued to make mezza majolica, and improved in the decoration of it. Toward the close of the century they began to use the stanniferous enamel, and the art sprang at once into its period of greatest success. The mezza majolica was decorated at first with masses of color, then with Saracen patterns, and finally with arms, heads, and portraits. Pesaro and Caffagiolo had factories, which were celebrated in the 15th century, and retained their renown in the 16th. Other factories rapidly earned fame, at Faenza, Florence, and elsewhere. The ware made with the new enamel was called *porzellana*, a word the origin of which is unknown, but from which we have porcelain. The styles which characterized the mezza majolica decoration continued in use on the new ware until about 1530, when they were abandoned, and the next ten years cover the period of the finest Italian majolica. The Gubbio factory now took the lead. Giorgio Andreoli, known as Maestro Giorgio, a sculptor and painter, devoted himself to the fabric. His work is remarkable for golden yellow and brilliant ruby red, for rich metallic lustre, and for superb paintings in a great variety of styles. Francesco Xanto and Orazio Fontana of Urbino rivalled him in all kinds of work. Many of the most eminent artists of Italy furnished designs for the decoration of pottery, and some of them probably amused themselves occasionally by doing the work of painting. Castel Durante, Naples, Pavia, Perugia, Venice, and numerous other localities in Italy produced majolica wares. These were always soft pottery, covered with brilliant enamel and painting. In England the name "Raffaelle ware" has been given to majolica, from the fact that many of the designs of Raphael Sanzio are found on pottery. It is not known that he furnished these, but Marc Antonio's engravings after Raphael seem to have been freely used by designers. Battista Franco, Taddeo Zuccari, Raffaelle dal Colle, and others, are known to have furnished designs. Guido Durantino, Girolamo Lanfranco, Flaminio Fontani, and others, were celebrated painters of the ware. The decline of the art began before 1560, but it continued to be practised in Italy down to the 18th century. Articles were made in a vast variety of forms, huge vases, ornamented pitchers and jugs and cups, dishes of every shape and size, *amatorii* dishes with portraits of ladies to whom they were presented, and great numbers of vases and pots for drug shops.—At Oiron in France, about 1520, a private pottery was established by Hélène de Hangest-Genlis, widow of Arthur Gouffier, a lady of high rank, and was continued after her death by her son Claude Gouffier. The products were few in number, and probably not made for sale. The ware is of very fine clay, with a thin glaze. The decoration was made by graving out patterns in the

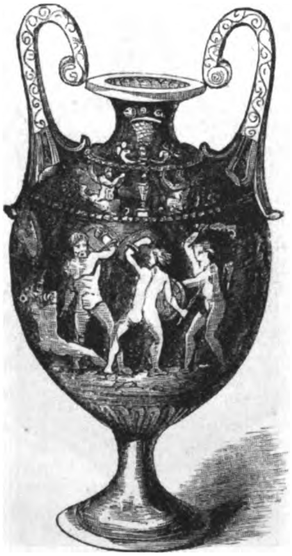


FIG. 6.—Italian Majolica Vase.

clay and filling in the lines with colored clays. This ware is known as Henri Deux ware, or *faience d' Oiron*, and is very rare. At present (1875) only 53 specimens are known, of which 26 are owned in France, 26 in England, and 1 in Russia. Very beautiful enamelled tiles were made in Rouen, by a potter named Abaquesne, as early as 1535. About 1555 Bernard Palissy at Saintes, after great labor and perseverance, discovered the secret of stanniferous enamel. (See Palissy, Bernard.) He produced remarkable works in soft pottery enamelled, the decorations being generally in relief, and especially fine in imitations of shells, fish, lizards, and other objects in nature. He removed to Paris, and carried on extensive works there under royal patronage until his death. The art now spread in France. At Nevers a factory was in existence in 1578, which became celebrated. The Rouen factory, which was probably the greatest in France, became equally so. The factories of Moustiers, Strasburg, Marseilles, Niederweiler (Niderviller), and a hundred others in France are enumerated.—We have already mentioned early examples of glazed or enamelled pottery in Germany. Veit Hirschvogel of Nuremberg made fine enamelled pottery before his death in 1525, and Nuremberg thereafter produced work of the best class. The large stoves which are used in Germany were built of tiles, affording opportunity for superb decoration, which was not lost. Hans Kraut, at Villingen in Swabia, was celebrated for his work on stoves, and in 1536 made an enamelled pottery tomb of great size, with a view of the siege of Rhodes in relief, which was placed in the church of the knights of St. John at Villingen. The art spread through Germany, and potteries were founded in various localities.—In Holland pottery had been made at Delft as early as 1530, and after the beginning of the 17th century Delft supplied most of northern Europe with household wares. The abundance of clay suited to the purpose made the place famous for potteries, of which 30 were at work in the 17th century. England received its supplies from Delft, and it thus occurred that the English language adopted the word delft for household earthenwares, as it adopted china for porcelain wares. Jan Steen, Van der Meer, Jan Asselyn, and other eminent Dutch artists decorated Delft pottery. The wares were improved from time to time until they rivalled in thinness, purity of enamel, and surface appearance the best Chinese porcelain. Every form of article was produced, even to violins. Whole table services were made, of which the dishes were in the forms of the viands to be served in them.—From Delft the art crossed over to England. Various rude forms of pottery had been made in England from remote times. The Romans had made their wares here. Staffordshire, where clay was abundant in good quality, had been the seat of potteries for many centuries. In the 17th century large dishes were made in Staffordshire, with rude decorations in color, covered with a thick glaze. About 1690 two brothers named Elers, coming from the Netherlands, established in Staffordshire a pottery, at which they produced a fine red ware resembling Japanese. This was the commencement of artistic work in England,

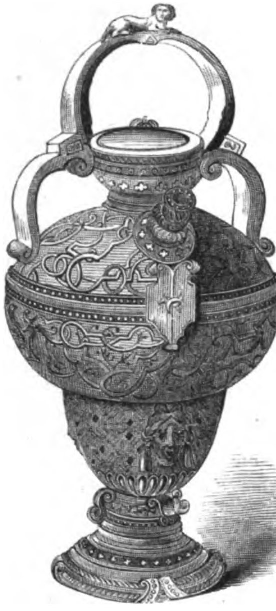


Fig. 7.—Henri Deux Fayence Vase.

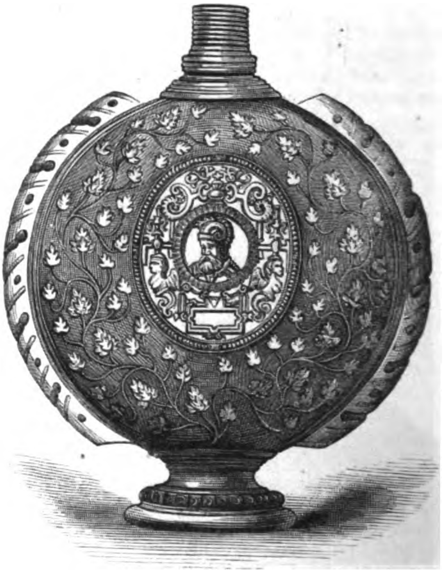


Fig. 8.—Pilgrim-shaped Grès Bottle.

but no great progress was made for many years. The English delft was so like the more ordinary class of Dutch that it cannot always be distinguished from it. The first great advance made in England was by Josiah Wedgwood, who revolutionized the art in all Europe. The Wedgwood family were potters at Burslem in Staffordshire. Josiah was born in 1730, became a potter at Stoke-upon-Trent, returned to Burslem in 1759, and bought a small pottery, enlarged his works, introduced from time to time great improvements in the art, erected a vast pottery at a point near Burslem which he called Etruria, whither he removed his works, and until his death continued his contributions to the practical and artistic improvement of pottery. He introduced new and beautiful styles of decoration on the old wares. In 1762 he made a new kind of pottery called cream ware or Queen's ware, composed of white clay and flint with a pure glass glaze. In 1766 he invented the black basalt ware. In 1773 he introduced a new paste, in which he produced articles ornamented with cameo work, portraits, reliefs, &c.; and this material he improved until it became his celebrated jasper ware. Wedgwood was imitated and copied throughout Europe. He employed good artists to make designs and moulds for his works, among whom Flaxman was conspicuous; he borrowed antique gems in immense number for facsimile reproduction, and his taste and skill were exercised in supplying thousands of varieties of artistic productions. The art advanced rapidly in England, and numerous potteries became famous. One immediate result of Wedgwood's discoveries was the introduction of new pastes, called stonewares, which occupy a position between pottery and porcelain, and for which English potteries have become especially known. The hard paste porcelain of China having been imported into Europe in the 17th century, and the art of making it discovered in the 18th, potters sought to imitate it in earthenwares, and succeeded. The division of porcelain into two classes, soft and hard paste, becomes in examining English wares impracticable, since the pastes are but different classes of pottery, running up from soft pottery to hard porcelain in one direction and to opaque glass in another. The most important modern addition to these pastes is one the invention of which is claimed by two great houses, Minton and Copeland, known as Parian biscuit. A mere enumeration of the various English potteries and their products would require more space than can be given to this article. —The natives of Peru, Central America, and Mexico made pottery in remote times, of coarse fabric, decorated with reliefs or additions of rude objects. They also made images of deities. Some of the ancient American work is of remarkable artistic ability. The Mexican, Central American, and Peruvian are of the same general description. The European settlers have not practised the art to any great extent. Bricks, tiles, and coarse earthenware have been and are produced in great quantities, and ordinary household earthenware has been made. Josiah Wedgwood, in a letter written in 1765, speaks of a pottery as then projected in South Carolina, but nothing further is known of it. Butter jars, jugs, and coarse gray wares with salt glaze, were made at Stonington, Norwalk, and Norwich, Conn., and probably in other parts of the country, in the last century. No artistic attempts are known until about 1846, when a factory at Bennington, Vt., produced figurines, vases, &c., in soft pottery, with brown and tortoise-shell enamelled surface.—*Porcelain.* The Chinese had made pottery from a period of unknown antiquity. The invention of hard paste porcelain was but the discovery of a new paste which would produce a translucent pottery, and this was found by uniting a peculiar clay, called *kaolin*, with powdered feldspar, called *petuntse.* The earliest mention of porcelain in Chinese literature indicates the date of this discovery in the 2d century B. C. No specimens of the ware of that time are known. Our knowledge of Chinese porcelain from actual inspection begins with the 11th or 12th century, at which time they made articles in a pure white paste, with rich enamel, the decorations consisting of raised work, or more frequently of delicate patterns of fern and other leaves produced by the use of a paste of a slightly more opaque white. Contemporary with these, or very shortly after,

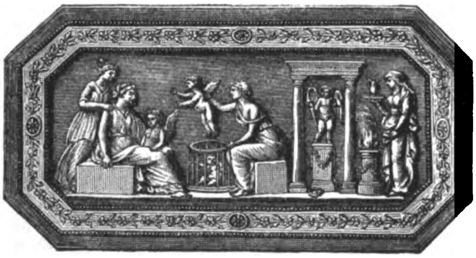


FIG. 9.—Wedgwood Cameo.

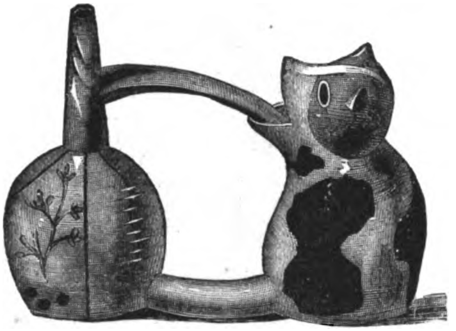


FIG. 10.—Peruvian Funeral Vase.

the Chinese made the wares known as crackle, distinguished by the breaking up of the enamel in coarse or fine cracks running in all directions. The same effect is often produced on modern stoneware and porcelain by continued exposure to heat and cold. With the orientals, however, the process was reduced to a fine art, and they were able to produce it in different sizes, and on separate portions of the same article. The manner in which it was done is not known, but it is evident from examination that the articles to be decorated in this way were composed of two varieties of paste, the interior or core of the article being of a softer paste than the inner and outer surfaces, which were of a hard enamelled paste. Such an article, subjected to heat sufficient to fuse the softer core and plunged suddenly into cold water, would crack in a thousand lines, which would be filled with the fused paste of the inner core. Varieties in the crackle would depend on varieties of paste, degrees of heat, and the use of different pastes in different parts of the same piece. This theory is however purely conjectural. The crackles are found with varieties of color in the lines, and also in the surface decoration. From the earliest times of which we know anything the Chinese excelled in rich colors. Their yellow, green, blue, violet, and red, in innumerable shades, are the envy of European potters, who have never succeeded in equalling some of them. The art was practised with equal skill for many centuries. Since the beginning of the 18th century the products have not been as fine as in former ages, but the falling off is in the style of decoration and not in the quality of the porcelain.—Japan made pottery from a very remote time, and is supposed to have derived the art of making porcelain from China through Corea about B. C. 27. In the 13th century the Japanese derived the art anew directly from China, and thereafter the Japanese work equalled and sometimes surpassed the Chinese. It is not easy to distinguish the products of the two nations, but the Japanese porcelain is generally of a purer white, and the decorations, especially in flowers, are more true to nature.—All the oriental porcelains are hard paste. Toward the end of the 16th century Grand Duke Francis I. of Tuscany had a laboratory in which he made a paste now classed as soft paste porcelain, and which is the earliest ware of this kind made in Europe. The art was lost, and not revived till 1695, when a factory was established at St. Cloud in France, where soft paste porcelain was produced. The composition of soft paste being clay in union with various other substances, it follows of course that when the clay used has kaolinic characteristics, the resulting ware may be hard paste porcelain; and for this reason much confusion arises in distinguishing the character of works produced at the same factory, especially in England. It is also to be noticed that as silex is largely used in some pastes, as it is in glass, an increase in the proportion of silex results in an approximation to glass, and some factories have produced work which differs very little from opaque glass. Most of the large factories of Europe have produced both hard and soft pastes, and many factories have also produced varieties of pottery. The importation of oriental porcelain into Europe was large and increasing during the 17th century. Its durability and superiority to pottery were recognized. Augustus, elector of Saxony and king of Poland, employed a young chemist named Böttger or Böttcher in 1701 to search for the philosopher's stone. Böttger, in the course of his experiments, hit upon a paste which being baked produced a hard stoneware, red and brown, resembling porcelain. The importance of his discovery was recognized, and he pursued his investigations until a happy accident about 1710 helped him to success. His valet had purchased in Dresden a hair powder, the weight of which attracted Böttger's notice and induced him to try it in one of his pastes. The result was the production of true porcelain. The powder proved to be a clay found at Aue, identical with the Chinese kaolin. The art being discovered, great exertions were made to preserve the secret. The workmen were prisoners at Meissen, and the works were secluded. In 1715 the first sales were made. The earliest wares were decorated in blue and white in imitation of the Chinese, and soon after polychrome decorations came into use. In 1720 Horoldt became director of the factory; from 1731 to 1733 Augustus himself took the direction; from 1733 till the seven years' war Count Brühl was in charge. Frederick the Great after occupying Saxony transported workmen and materials to Berlin, but the Meissen factory soon resumed work. Dietrich, the well known artist, was one of the commissioners in charge. From 1774 to 1814 Count Marcolini was director. The best period of the Meissen factory is generally regarded as that prior to 1774, which is commonly called the king's period, but the Marcolini period was scarcely if at all inferior to it. In purity of paste and enamel the Dresden porcelain (as the Meissen ware is called) has never been surpassed. In decoration, especially in bouquets, flowers, birds, and landscapes, it has seldom been equalled, much of its work

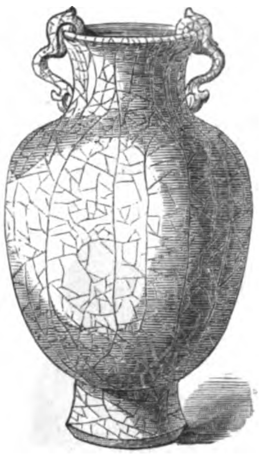


FIG. 11.—Chinese Crackle Vase.

being decidedly superior to that of Sèvres, its chief rival.—From Saxony the art of hard paste porcelain spread rapidly through Europe, in spite of all efforts to preserve the secret. A workman named Stölzel escaped, and by his aid a factory was established in Vienna about 1720. Ringler, a Vienna workman, went to Höchst, where potteries had long existed, and by his aid porcelain was here made in 1740. From Höchst the art was widely scattered. Ringler when intoxicated was robbed of his secret by his fellow workmen, who sold it in all parts of Europe. The work of Höchst is celebrated, especially for artistic figurines. Bengraf, a Höchst workman, introduced the art at Fürstenberg. Wegely at Berlin obtained his knowledge from Höchst, and commenced making hard paste in 1751. This factory subsequently became royal property, Frederick the Great supplying it as before stated from Saxony with workmen, models, and materials. It has ranked among the first factories in the world down to the present time, having recently made great advances and produced works which surpass its ancient fabrics. Ringler left Höchst and established a factory at Ludwigsburg in 1758, which produced work of the best quality. About 1759 a chemist named Macheleid in Thuringia made an independent discovery of the art of making hard paste porcelain, and factories were established at Volkstadt, Rudolstadt, Wallendorf, Grossbreitenbach, and Limbach. In Hungary, at Herend, a factory was established in the last century, which has produced remarkable imitations of oriental fabrics. The art also early spread from Meissen to Russia and Sweden. Höchst workmen conveyed it to Switzerland, where Zürich had a factory about 1760, and Nyon another somewhat later. In 1745 a factory was founded at Vincennes, near Paris, for the making of soft paste porcelain; in 1756 the factory was removed to Sèvres; in 1758 Louis XV. became part proprietor, and in 1760 sole owner. In 1765 specimens of hard paste porcelain were made, and from 1769 to 1804 it was made in common with soft paste. From 1804 to 1847 only hard paste was made; since that time both kinds have been produced. The great reputation of the Sèvres factory is the result of the dedication of the highest artistic talent to the composition, form, and decoration of porcelain. The list of artists employed is extensive, and their works in every variety of decoration are of exceeding beauty. At Doccia in Italy, near Sesto, 5 m. from Florence, is the porcelain manufactory of the marquis of Ginori, which in 1878 employed 550 men.—The first porcelain made in England was probably at Stratford-le-Bow, about 1740–'43. The Bow factory made both soft and hard paste. The latter is said to have been made of clay which an American carried to England for the purpose of introducing it in the potteries; it was stated that it came from lands in the Cherokee country. The Chelsea factory was established about 1745, and its best period was from 1750 to 1765. In 1769 it was bought out by Duesbury, proprietor of the Derby factory, which he had founded in 1751, and to which he united the Chelsea works. The wares of both factories were of the highest character both before and after

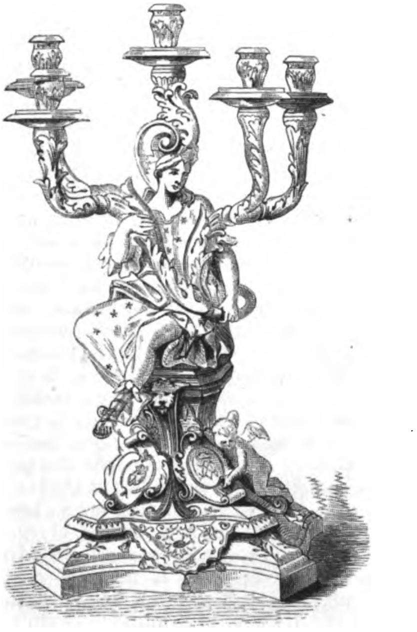


FIG. 12.—Candelabra of Dresden China.

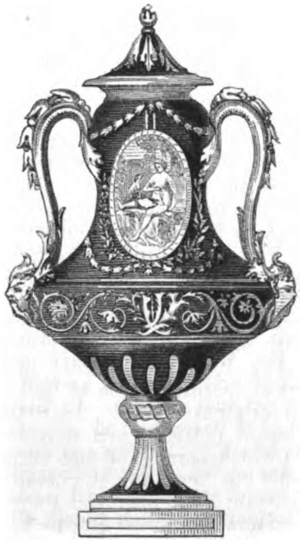


FIG. 13.—Sèvres Vase with Cover.

the union. The Derby factory still continues in operation. In 1760 a factory for hard paste was established at Plymouth by Cookworthy, the first specially devoted to hard paste in England. In 1772 it was purchased by Richard Champion of Bristol, and the material was transferred to that city, where Champion had founded a factory a few years previously. Bristol porcelain had great celebrity. Pottery was also made there, which had extensive sale in America. Porcelain was first made at Worcester in 1751, and the factory there was of the highest importance from the amount and artistic excellence of its products. In 1753 the Battersea enamel works had used the art of transfer printing on enamel, and the Worcester factory was the first to apply the art to pottery and porcelain. The invention is ascribed to J. Sadler, a Liverpool engraver, and as at first practised consisted in taking an ink impression from a copper plate on paper, which was gently pressed on the surface of the ware in bisque condition. A later improvement consisted in bat printing, which was taking an impression in oil only on a bat of glue, which being pressed on the ware transferred the oil to the surface, and then metallic color was sprinkled on, the oil causing it to adhere in the form of the engraved picture. This simple discovery revolutionized the art, in making beautiful decoration cheap and bringing hitherto expensive works of beauty within the reach of families of small means. It has been greatly improved in more modern times, and is now practised in printing several colors with all the success of chromo-lithography. The Worcester factory made close imitations of oriental wares, as well as superb works in original designs. In Staffordshire the number of potteries and porcelain establishments which sprang up and attained eminence defies our space for enumeration. The most important in a historical point of view are the factory of Josiah Spode, founded at Stoke-upon-Trent about 1770, and that of Thomas Minton, founded at the same place in 1790. Both produced elegant works and became large and flourishing manufactories, the former being now the works of Copeland, and the latter of Minton, two houses whose works are unsurpassed if indeed they are equalled in the modern world. Simple mention must suffice of factories at Caughley, Newcastle-under-Lyme, Pinxton, Nantgarw, Lane Delph, Swinton, and Coalport. An important factory existed near the close of the last century at Lowestoft, where hard paste porcelain was made so closely resembling Chinese that it can with difficulty be distinguished from it. The characteristic of the decoration was very delicate work in borders, initials, crests, &c., small flowers, usually roses without stems, lines of deep blue with gold stars, and occasionally landscapes.—A successful attempt was made to establish porcelain works in Philadelphia between 1820 and 1825, by a gentleman named Tucker; but he abandoned the business in a few years, being discouraged at his failure to find artists who could decorate the ware. Since then the "Union Porcelain Works" of Thomas C. Smith and son have been established at Greenpoint, Long Island, and entire table sets and other articles of excellent hard porcelain are manufactured and decorated there. Several kilns are employed in baking at this establishment. The first fine stoneware made in this country is said to have been by Morrison and Carr at South Amboy, N. J. The manufacture of earthenware is now carried on to a considerable extent in the United States, its principal seats being at Trenton, N. J., where there are 13, and at East Liverpool, Ohio, where there are 6 establishments devoted to fine stoneware and white earthenware. —*Manufacture.* The base of the materials for all kinds of pottery, except the old Sèvres china, which is now no longer made, is clay; and upon the kind of clay and the ingredients with which it is mixed, and also upon the degree of heat used in baking, depends the product. For a description of the different kinds of clay, see CLAY. Common building bricks are made of common blue, brown, or red clay, mixed with varying proportions of sand. (See BRICK.) Land tile for draining is made of much the same material, and is often baked in the field where the draining is required. Drain tile for sewage is made of common plastic clay, the pipes being moulded by pressing the material between a solid cylindrical core and a hollow external cylinder. The baking is done in an ordinary upright kiln, like that shown further on for the baking of earthenware. The tiles are glazed by dipping them when green into a thin mixture of water and a fusible calcareous clay, the baking of the body and the fusing of the glaze taking place at one firing, which requires about 48 hours at a white heat. A thin mixture of water and clay or other solid ingredients of pottery is called "slip." The method of preparing the clay for working is the same as that which will be presently described for the manufacture of common stoneware. Fire bricks are made of an infusible kind of clay called fire clay, analogous to kaolin, mixed with about 33 per cent. of quartz sand (crushed and ground quartz), or ground old brick. Roofing tiles are made of a clay which will fuse in baking, or they are glazed after baking to render them impervious to water. As fusion tends to warp them, glazing is generally regarded as preferable. Floor tiles vary in character, some being compact and glassy, while others are more or less porous, depending on the proportions of clay, flux, and sand or ground quartz of which the body is composed. All kinds of pottery passing under the names of common stoneware, fine stoneware or stone china, earthenware, or true porcelain, as well as English tender porcelain, Parian and Wedgwood ware, are closely allied, their different characteristics depending upon the degree of fusibility of the mass and upon the heat employed in baking. When the materials are white, and in baking are brought to that state of fusion which produces vitrification and translucency, the product is a porcelain of more or less hardness and fineness. When the materials are coarse and contaminated with metallic oxides so as to render the ware opaque, common stoneware is produced, of a texture resembling that of porcelain, but much coarser. The various kinds and grades of earthenware, such as the cream-colored (c. c.) ware of Staffordshire, and fine stoneware, are distinguished by the granular or chalky surface of the fracture, instead of the vitreous fracture of porcelain, the former resulting from the absence of the degree of fusion necessary to produce vitrification. They are also distinguished by the more fusible and superficial glaze, which is applied at a lower heat than is employed for glazing porcelain.—In ordinary stoneware vessels, such as butter, preserve, and pickle jars, the clay, after it has been exposed to the weather and treated with water sufficient to form a plastic mass which can be readily moulded by the hand, is simply worked up in a kind of pug mill similar to that used for mixing clay in a brick yard. A vertical shaft armed with knives, placed with the planes of their blades in a spiral direction, is made to revolve by horse or other power within a stout cylinder having a funnel-shaped top. From the inside of the cylinder knives also project, and by the action of both sets the moistened clay is reduced to a homogeneous mass and forced down to the bottom, from which it issues through a rectangular orifice 8 or 10 in. in diameter. It is projected upon a platform, when an attendant cuts it into thin slices, and removes with his fingers stones and other solid substances. Some potters use coarse wire grating through which the clay is forced, and which retains the solid particles that are too large to pass through the meshes. The meshes however soon become filled so as to prevent the free passage of the clay, and it is found more practicable to remove the stones, &c., by hand. In this country common stoneware is usually made from clay alone, but in Europe a little fine sand and feldspar and sometimes chalk is used. The mass when tempered to the proper consistency is taken to the potter's lathe or "throwing wheel," to be formed into ware, or "thrown," as the operation is technically called. The potter's lathe is one of the most ancient machines, and was used in Egypt 4,000 years ago. Its oldest form was that of an upright shaft about 3 ft. high, which turned in a frame, having a small horizontal wheel at the top and a larger one at the bottom 3 or 4 ft. in diameter, and also horizontal, by which it was made to revolve by the action of the workman's foot. A treadle like that of an ordinary turner's lathe is more commonly used, or the form shown in fig. 15, which requires the help of an assistant. In large potteries steam power is employed. A common stoneware vessel having a circular horizontal section is "thrown" in the following manner. The workman takes a mass of the plastic clay and throws it with a smart blow upon a circular block of gypsum which forms the head

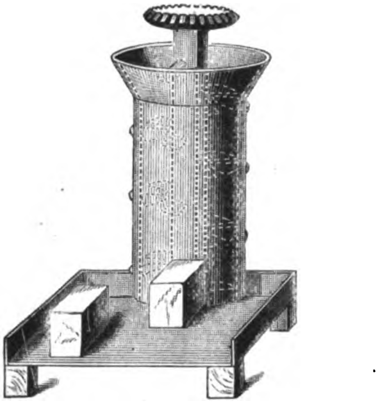


Fig. 14.—Pug Mill.

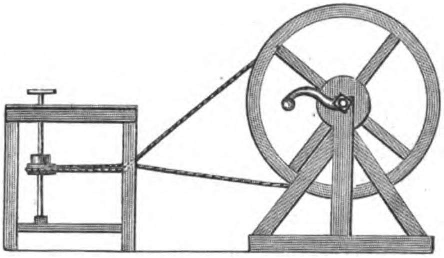


Fig. 15.—Potter's Lathe.

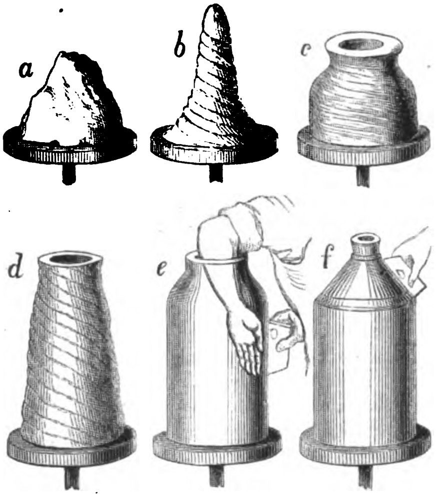


Fig. 16.—Stages of Formation.

of the lathe, and then presses it firmly with his hands, which he wets in a vessel of water conveniently near, forming it first into a conical shape, represented at *b*, fig. 16, by which means the remaining portions of air are worked out of it, and it is also rendered more plastic. The workman then forces his thumbs into the centre of the mass, holding his fingers on the outside, and gives it the form shown at *c*. Then, by placing one hand upon the inside and the other upon the outside, the forms shown at *d* and *e* are given; and afterward, by means of the simplest tools, made of wood or leather, which are kept wet, the thickness of the article is still further reduced, its general dimensions enlarged, and its shape perfected. With a fine wire which he holds at each end the workman separates the piece of ware from the block, and it is then removed to a shelf, usually in an adjoining room, to dry, after which it is placed in the kiln with other like articles. The kilns for common stoneware vary in form. In England they often have much the form of an ordinary reverberatory furnace, as shown in fig. 17, where *r* is the grate, *a* the ash pit, *c* the baking chamber, and *d* the chimney. A vertical form, such as that for earthenware shown further on, is generally used in the United States. The articles are placed in cells formed of baked slabs, as shown in fig. 18. The hot air from the furnace, passing through these open cells, raises the clay to the proper temperature. The firing may continue from 24 to 48 hours, depending upon the size of the pieces, the fusibility of the clay, and the extent of vitrification which may be desired. Toward the close of the operation a quantity of common salt is thrown into the kiln, which is volatilized by the heat, and coming in contact with the ware is decomposed; the sodium combines with the silica of the clay, forming a soda glass, which again fusing with the clay beneath forms a tough, vitreous, earthy substance of great durability. On the continent of Europe common stoneware often receives no glaze other than that conferred by high firing.—The manufacture of earthenware requires more care in the selection and preparation of materials and more skill in the workmen. The best materials are kaolin, pipe clay, quartz or flints, and feldspar, the kaolin and quartz to impart hardness, and the pipe clay and feldspar to yield a flux sufficient to bind the mass firmly together. The proportions of course vary with the quality of the clays and the fineness of the ware which is to be made. When the fineness and hardness exceed a certain degree, the ware ceases to be called common earthenware, but is technically called fine stoneware. The proportions of materials for a good article of Staffordshire cream-colored (c. c.) ware may be stated as follows: pipe clay 40, kaolin 25, quartz 20, and feldspar about 15 parts in 100. If the pipe clay is quite infusible, less must be taken of it, with a greater proportion of feldspar. The quartz and feldspar are procured in this country of the manufacturer, already ground to a fine dust. Many of the best potters mix the materials together in the dry state, and then thoroughly incorporate them in a rotary "blunger" moved by steam power. This blunger is a horizontal cylindrical or octagonal box 10 or 15 ft. long by 3 or 4 ft. in diameter, within which is a horizontal shaft armed with strong paddles placed like the teeth of a threshing machine, only larger and longer and revolving with much less velocity. Water enough is added to make a thin mixture called "slip," which, after being worked in the blunger for a sufficient time to effect thorough incorporation, is drawn off through a trough and also a fine silk gauze strainer, and received in a vat, from which it is forced by a powerful hydraulic pump into a system of strainers or consolidating apparatus patented by Needham and Kite. The machine consists of a number of flat shallow vessels composed each of two parts, as shown in fig. 19, and containing a stout fine hempen bag, suspended on hooks, and having a nozzle into which the slip is forced from the pipes *d* and *c*, *c*, *c*, fig. 19, which shows the apparatus in working position. Grooves against which the bags rest are shown at *b*, and the holes in both *a* and *b* are for the purpose of allowing the water to escape. It is received in a channel in the floor beneath the machine. The mass is thus re-

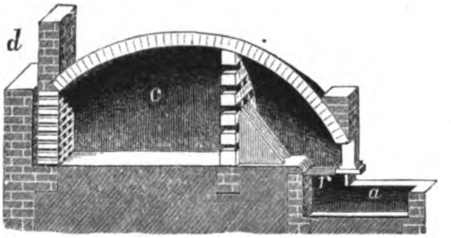


Fig. 17.—Kiln for Common Stoneware.

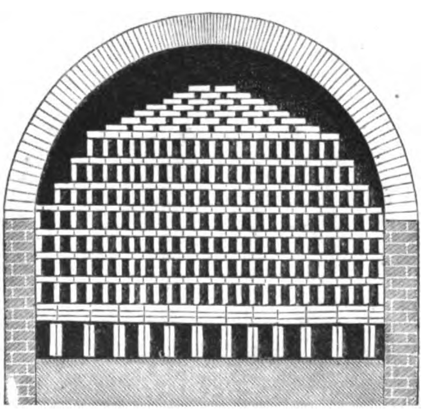


Fig. 18.—Cells of Stoneware Kiln.

duced to the proper consistency, although it is not perfectly homogeneous; to make it so, it is passed through a pug mill of a similar construction to that shown in fig. 1, except that it need not have stationary knives on the inside of the cylinder. It is received by an attendant and cut by a fine wire into rectangular blocks, when it is sent to the thrower or moulder, the throwing being performed similarly to that for common stoneware. If it is made into irregular, square, or oblong articles, it is moulded by beating and rolling the mass into a sheet and then shaping it over a block. A round plate is formed on a circular block on a lathe head and moulded with a form attached to a standard, as shown in fig. 20. A pitcher or ewer is formed on the inside of a hollow mould of plaster of Paris, fig. 21, which is the counterpart of the outside of the vessel. This mould is usually made in two parts, which, after they are each lined with a sheet of the mass, are put together and the seams united by pressure with the fingers. Sometimes the ware is cast in a mould in a manner similar to that for casting plaster of Paris (see CASTING), in which case the paste or slip must be thin enough to flow easily. A plaster of Paris mould is used, which if dry absorbs the water rapidly, the consolidated mass sinking to the bottom. By continuing the pouring, the mould may at last be filled with the consolidated material. Pieces formed by moulding in plaster of Paris soon lose by standing enough water to cause them to shrink, when they may easily be taken out. About a dozen moulds are generally used by one moulder, so that by the time that number of articles are moulded the first piece will be sufficiently firm to allow of removal. The green ware is placed upon shelves that it may become sufficiently dry to be dressed and if necessary "handled," as the operation of putting on the handles is called. Each end of the handle is dipped into a thin paste of the same material and stuck on, and enough added to secure good attachment and give the proper form. Those pieces which are thrown upon the lathe, and therefore have a circular section, after becoming sufficiently dry, are turned upon a lathe with a sharp tool, to give them a uniform surface. After turning and handling, the ware is made perfectly dry in a drying room, and then baked in a kiln of the form shown in fig. 22. The furnaces, not shown here, are sometimes constructed on the principle of the base-burning stove. Instead of being placed in open cells made of baked slabs, as shown in fig. 18, the articles are placed in tight cases called "seggars." These seggars must be made of more infusible material than that of the ware itself, or they would fall down with the weight they bear. A seggar has somewhat the form of a cheese box, as shown in fig. 28, but may be either oval or circular. It has no separate cover,

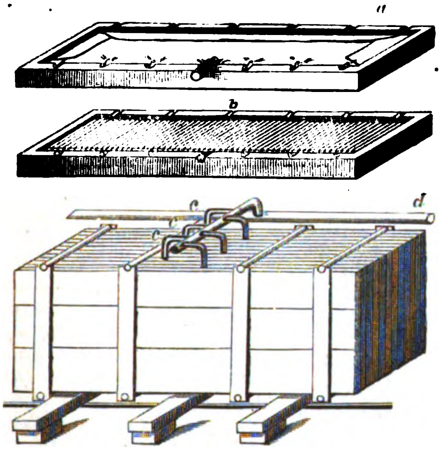


FIG. 19.—Needham and Kite's Consolidating Apparatus.

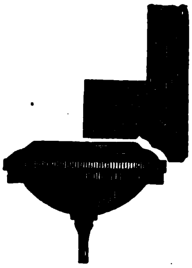


FIG. 20.—Moulding a Plate.

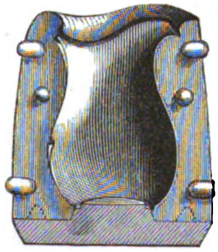


FIG. 21.—Mould for Ewer.

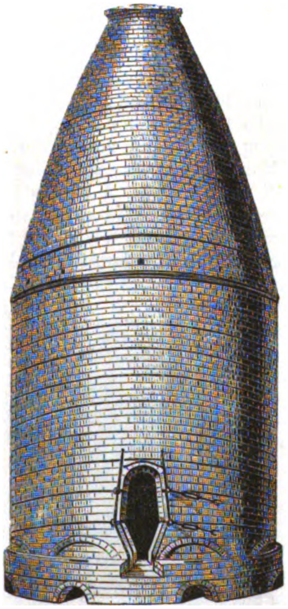


FIG. 22.—Earthenware Kiln.

but each seggar forms a cover to its fellow beneath. Seggars are made of infusible fire clay mixed in a pug mill with old broken seggars, ground to a granular powder. The old seggars, being composed of already burned and shrunken material, allow of less contraction in baking, and preserve their shape better during a hard firing. Experienced potters do not mix sand with them, because it is thought that when made as above described they are more homogeneous and less liable to crumble when shrinking. A seggar is made as follows. The mass, having been placed in a compact pile, is cut in slices by a sharp spade and thrown with a smart blow upon a stout plank table until a sheet sufficient for the sides of two or three seggars is formed. It is compacted with a broad-faced mallet swung smartly with both hands, and a compressing roller or smoothing tool is then run over it, reducing it to a uniform thickness (about three fourths of an inch to an inch). A long straight-edge ruler is then laid upon the sheet, and it is cut into strips of the proper width for the height of the seggar, and of a length equal to its circumference. An assistant (usually a boy) in the mean time has formed a circular or oval sheet for the bottom of the seggar. The seggar maker takes a wooden form and wraps the strip which he has cut around it, and connects the ends together. He then fits on the bottom and removes the form. It is now ready for the kiln, and is fired at a white heat for 36 or 48 hours. In these seggars the ware is placed, and they are then piled one upon the other in the kiln. In placing the ware in the seggar the bottom is lightly covered with infusible fire sand to prevent adhesion. Sometimes granulated quartz is used. The seggars are piled in columns as shown in fig. 24, which are so arranged as to cause the most equable diffusion of heat. The kiln is then fired, and the ware raised to a white heat, which is continued for about 36 hours. This forms what is termed hard or earthenware biscuit. The fires are now allowed to go out and the kiln to cool, and as soon as the workmen can enter the seggars are removed and the biscuit taken out. It is very hard, ringing when struck, and so porous that it will absorb water rapidly. It is now dressed, all rough prominences being removed, when it is ready to receive the glazing by which it is rendered impervious to liquids and given a polished surface. The glaze of earthenware is always much more fusible than the body, and is baked with a dull cherry-red heat. It is usually composed of white clay, ground quartz, feldspar, and white lead, with small quantities of sal soda and boracic acid.—Fine stoneware, sometimes called ironstone china and white granite (w. g.) ware, is made of rather more infusible materials than common earthenware, and is baked with a higher heat. The glazing is much the same, though less fusible and of more carefully selected materials. A "frit" is generally used as one of the ingredients of fine stoneware glaze, or the whole glaze may be made into a frit, which may afterward be ground to an impalpable pulp. The following is a frit commonly used: ground feldspar 25 per cent., ground quartz or flint 25, sal soda 25, plastic clay 15, boracic acid 10. The materials are mixed together and fused in a frit furnace, which consists of a long chamber in the bottom of which the material is laid after having been well mixed. The fire enters at one end and passes out at the other, much after the manner of an ordinary reverbatory furnace. A white heat melts the mass to a liquid, which is then drawn off by the removal of a plug, and received into a brick or stone vat. When cool it is broken in pieces and ground to a fine paste with water in a circular tub-shaped vat, similar to those used in England in grinding Cornish stone for the preparation of porcelain clay. Such a mill is shown in fig. 25. A shaft, by which the mill is turned, passes up through a hollow cylinder, and has attached to it strong arms, to which are fastened vertical slats, by which buhrstones are carried around over the bottom of the vat, which is also composed of pieces of buhrstone. The frit after being ground is mingled with white lead, and usually a small amount of cobalt blue, which gives fine stoneware its pearly whiteness. Before using, the glaze is mingled

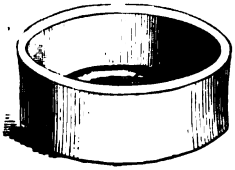


FIG. 23.—Seggar.

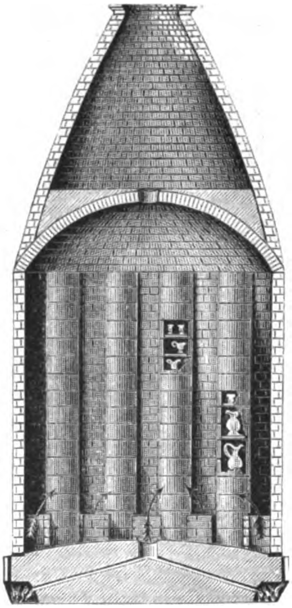


FIG. 24.—Section of Earthenware Kiln.

with water sufficient to form a thin slip which shall contain just enough of the solid materials in a state of suspension to cause a coating of the proper thickness when the ware is dipped in it a certain length of time. The particles are kept suspended by stirring, and the thickness of the slip may be regulated by the frequency of the stirring, and varied from time to time if different thicknesses of glaze are required. The porous biscuit is dipped in the glaze slip, and quickly placed on a bench at the edge of the dipping vat, from whence the pieces are removed by an assistant. The rapid absorption of the water causes the deposit of a thin paste upon the surface, which fuses and flows over it at the second firing.—Hard porcelain is composed of finer materials than fine stoneware, and the glazing is very different, and more nearly resembles the body of the ware. The throwing and moulding of porcelain requires more care and skill than that of coarser ware. Some of the pieces are exceedingly thin and delicate, and can only be formed by experienced workmen. There are difficulties in making large thin vases, which have been overcome at Sèvres by the employment of atmospheric compression and exhaustion. A plaster mould is coated upon the inside with sufficient slip to form ware of the desired thickness, and this is held against the side of the mould until it acquires enough firmness to support itself by either covering the mouth of the mould and forcing air into the interior, or exhausting the air through the porous plaster by means of an exterior air-tight case. The first firing is of a much lower heat than that for stone or earthenware, converting the material into a soft instead of a hard biscuit, and is conducted in the upper story of the porcelain kiln, shown in fig. 26. The biscuit is then dipped into a glaze composed of ground quartz or flints, feldspar, lime, and porcelain clay, which fuses at a white heat and fluxes with the body of the ware, so as to form with it as well as upon the surface a vitrified translucent mass, which will not check or "craze" upon the surface when subjected to variations of temperature. The biscuit is placed in the lower story of the kiln, when during the same firing it is converted into finished porcelain. The average composition of porcelain body may be stated as follows: silica 66, alumina 30, potash 3·4, magnesia 0·6, lime 0·5. The following is an analysis of the glaze of modern Sèvres china, by Malaguti: silica 73·4, alumina 15·7, potash 7·4, lime 1·9, magnesia 0·3, loss by water 1·3 = 100 pints. Sometimes the glaze is composed of kaolin, gypsum, and broken porcelain. The beauty of porcelain depends upon the proper fusibility of the glaze, because when too difficult of fusion it will not form an even enough surface, while if too fusible it becomes too much absorbed by the body. Tender porcelain is of two kinds, the natural tender porcelain of England, in which kaolin is the basis, and the artificial tender porcelain (*pâté tendre*, soft paste) of France, or old Sèvres china. The average proportion of ingredients in English tender porcelain are as follows: calcined bone dust 47, kaolin 34, and feldspar 19 parts in 100. The phosphate of lime in the bones diffuses itself throughout the mass, forming a translucent enamel-like substance, which shrinks less in baking than hard porcelain, but has much less strength. It is said that the principal cause of the continuance of the exclusive manufacture of this kind of porcelain in England is the impossibility of obtaining material sufficiently cheap to make seggars which are able to bear the heat necessary for the baking of hard porcelain. A frit of bone, flint, or quartz and pearlash is sometimes first made, and then mixed with the kaolin and feldspar. The ware is baked twice, at a much lower heat than for hard porcelain; the first firing lasts the longest, from 48 to 50 hours. The biscuit is then glazed with a mixture of feldspar, carbonate of lime, borax, and white lead, and baked the second time at a lower temperature and during a shorter time. Colored glazes may be made by adding oxides of manganese, copper, iron, chromium, or cobalt, and opaque glazes by the addition of oxide of tin or phosphate of lime. The artificial tender porcelain

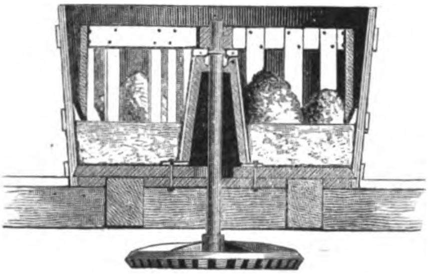


FIG. 25.—Grinding Mill.

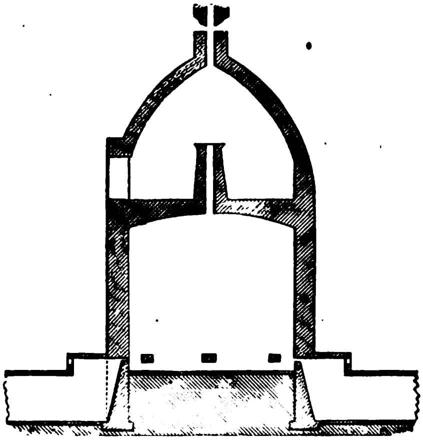


FIG. 26.—Porcelain Kiln.

of France has a dense vitreous body, fusible at a high temperature, with a transparent glaze, containing lead. The composition of old Sèvres china may be given as follows: A frit was made of melted saltpetre 22 parts, sea salt 7·2, burnt alum 3·6, soda ash 3·6, gypsum 3·6, sand from Fontainebleau 60. This was partially vitrified in a calcining furnace, then crushed and lixiviated to remove soluble salts, and afterward ground with millstones under water. The ground paste was then mixed with finely levigated chalk and calcareous marl, in the proportion of about 75 parts of frit, 17 of chalk, and 8 of calcareous marl. A glaze or enamel was used composed of litharge 38, burnt sand from Fontainebleau 27, calcined flint 11, subcarbonate of potash 15, and subcarbonate of soda 9 parts in 100. This process was replaced at Sèvres by that of Böttger for hard porcelain in 1765. The greater transparency and softer lead glaze are the distinguishing features of soft or tender from real porcelain. The decoration of porcelain is very similar to that of glass, except that it is always intended to be viewed by reflected and not by transmitted light. All the pigments are colored glasses, which acquire their lustre and adhesion to the mass by fusion, and consist of a flux with the addition of a coloring ingredient, generally a metallic oxide; such tints as will not withstand the action of heat being of course excluded. Yellow may be given by adding oxide of titanium or chromate of lead and chromate of baryta. Violet brown and black are produced by various proportions of oxide of manganese; blue gray and black, by oxide of cobalt; brown, by protochromate of iron; a beautiful black, by sesquioxide of iridium; purple, by purple of Cassius; red, by suboxide of copper; green, by oxide of copper and oxide of chromium. The most refractory colors are: for blue, cobalt; green, chromium; brown, oxides of iron and manganese; yellow, oxide of titanium; black, oxide of uranium. These colors may be applied to the biscuit or to the glaze, the silicate of an alkali being used with them for a flux. The material is usually mixed with oil of turpentine and applied with a brush. The ware is then placed in a muffle in the manner shown in fig. 27, and raised to a heat sufficient to have the pigment fuse into the surface, but far below that necessary to fuse the glaze.—See "Wedgwood and his Works," by Eliza Meteyard (London, 1873); "Two Centuries of Ceramic Art in Bristol," by Richard Champion (London, 1873); Jacquemart's "History of the Ceramic Art" (New York, 1875); "Ceramic Art at the Vienna Exhibition," by William P. Blake, U. S. commissioner (New York, 1875); and "Keramic Art of Japan," by George Ashdown Audsley and James L. Bowes (2 vols. fol., 1875 *et seq.*).

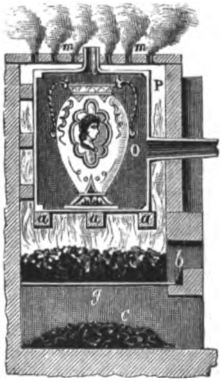
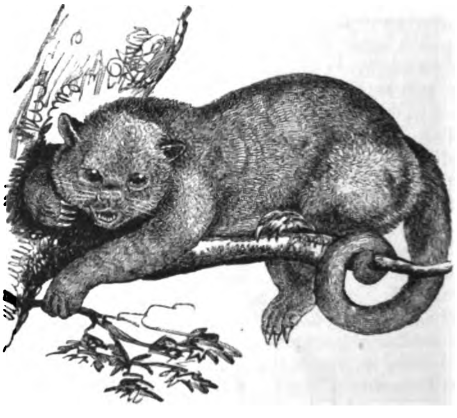


Fig. 27.—Muffle.

POTTINGER, Sir **Henry,** an English statesman, born in Ireland in 1789, died in Malta, March 18, 1856. He went to India as a cadet in 1804, occupied high offices there, and in 1839 was created a baronet for his long services as political resident and for some time regent in Cutch and Sinde. Being sent as envoy to China, he concerted measures with Admiral Parker for the taking of Amoy (Aug. 26, 27, 1841) and other important places, and concluded the treaty of peace (Aug. 29, 1842) which opened the great ports of China to all nations. He was appointed governor of Hong Kong, and in 1844 privy councillor, and received a pension of £1,500. In 1846–'7 he was governor of Cape Colony, and subsequently of Madras till 1854, when he went home.

POTTO (*cercoleptes*, Illig.), a genus of small carnivorous mammals, inhabiting tropical America. They resemble the bears in their plantigrade movements, and in their dentition, but differ in other characters; they seem to form the connecting link between the quadrumana and the plantigrade carnivora. The molars are $\frac{5-5}{5-5}$, small, the anterior two conical, and the others tuberculate with flat crowns, canines short and blunt; muzzle short and rounded; the eyes large; the tongue slender, long, and extensile; tail long, hairy, and prehensile; feet plantigrade, the five toes are separate, capable of independent motion, and provided with sharp claws; legs short; fur woolly. The common potto, sometimes called kinkajou (*C. caudivolvulus*, Illig.), is about the size of a cat, but more slender, of a general yellowish brown, sometimes reddish brown; in form and habits it resembles the lemurs, is nocturnal and an excellent climber, and uses



Common Potto (Cercoleptes caudivolvulus).

the fore paws to convey food to the mouth; it is omnivorous, feeding on fruits, honey, insects, eggs, and small birds and mammals, like other plantigrades; it is fond of plundering the nests of wild bees, obtaining the honey by means of its long flexible tongue, whence it has received the name of honey bear; it is a native of Guiana, Colombia, Peru, and some of the West India islands. Being gentle and playful, it is often tamed as a pet, and is not uncommon in menageries.—Potto is also the native name of an African lemur. (See Lori.)

POTTSTOWN, a borough of Montgomery co., Pennsylvania, on the Schuylkill river, and on the Philadelphia and Reading railroad, at the junction of the Colebrookdale railroad, 32 m. N. W. of Philadelphia; pop. in 1870, 4,125; in 1875, about 6,000. It contains three rolling mills, a blast furnace, a nail factory, an iron foundery, a large car shop, two planing mills, steel wheel works, two metallic axle companies, two carriage manufactories, a soap factory, several cigar factories, &c. Another blast furnace is in course of erection (1875). The roadway and transportation departments of the Philadelphia and Reading railroad give employment to a large number of men. There are two banks, a young ladies' seminary, a private school for young men, 16 public schools, a circulating library, a daily and two weekly newspapers, and 12 churches. Fair grounds with a mile track for races are being laid out.

POTTSVILLE, a borough and the capital of Schuylkill co., Pennsylvania, on the Schuylkill river, at the mouth of Norwegian creek; pop. in 1850, 7,515; in 1860, 9,444; in 1870, 12,384. It is the terminus of the Philadelphia and Reading railroad, by which it is 93 m. N. W. of the former city and 85 m. of the latter. It is picturesquely situated near Sharp mountain, on a very uneven surface, in the midst of an extensive coal region, which is the chief source of its prosperity. It is lighted with gas, and is well built, largely of brick. The chief public buildings are the court house, jail, town hall, union hall, opera house, and school houses. Immense quantities of coal are shipped from this point over the Philadelphia and Reading railroad, being brought from the mines by branch railroads. There are several founderies and machine shops, rolling mills, a brass foundery, three furnaces, a carpet factory, a shoe factory, and sash and blind factories. There are ten banks, with an aggregate capital of $1,500,000, good public and private schools, two daily and five weekly (two German) newspapers, a monthly periodical, an orphans' home, and 19 churches.

POUCHED RAT. See Gopher.

POUCHET. I. Félix Archimède, a French naturalist, born in Rouen, Aug. 26, 1800, died there, Dec. 6, 1872. He was son of Louis Ezéchiel Pouchet (1748–1809), an eminent manufacturer and author. In 1827 he took his medical degree in Paris, and in 1828 became professor at the museum of natural history in Rouen and director of that institution, and in 1838 professor at the medical school in that city. He invented an aëroscope and other apparatus, and propounded a theory of spontaneous ovulation, often designated as Pouchet's laws, which involved him in a controversy with Pasteur. His works comprise more than 80 volumes, the principal being *Théorie positive de l'ovulation spontanée et de la fécondation des mammifères et de l'espèce humaine* (Paris, 1847), for which he received an academical prize of 10,000 francs; *Histoire des sciences naturelles au moyen âge* (1853); *Hétérogénie, ou traité de la génération spontanée* (1859); and *L'Univers, les infiniment grands et les infiniment petits* (1865; English translation, "The Universe, or the Infinitely Great and the Infinitely Little," London, 1870). **II. Georges,** a French anthropologist, son of the preceding, born in Rouen in 1833. He took his degree in Paris in 1864, and was connected with the museum of natural history there from 1865 to 1869. In 1870 he was for a short time secretary general of the prefecture of police. His works include *De la pluralité des races humaines* (Paris, 1858; English translation by Beavan, London, 1864); *Précis d'histologie humaine* (1863); *Mémoires sur le grand fourmilier* (1868–'9); and *Sur les asticots* (1873).

POUGHKEEPSIE, a city and the capital of Dutchess co., New York, on the E. bank of the Hudson river, and on the Poughkeepsie, Hartford, and Boston and the Hudson River railroads, 75 m. N. of New York and 70 m. below Albany; pop. in 1860, 14,726; in 1870, 20,080, of whom 4,425 were foreigners. The greater portion of the town is on a table land from 150 to 200 ft. above the river. It is regularly laid out, with pleasantly shaded streets, and has good public buildings and many elegant residences. It is lighted with gas, and has a line of street railroad. A cemetery of 54 acres has been laid out near the southern limits. About 2 m. E. of the city are the buildings and grounds (200 acres) of Vassar college for young ladies. (See Vassar College.) About 2 m. N. of the city, on an eminence overlooking the Hudson, are the large and imposing buildings of the Hudson river state hospital for the insane, unfinished, though partly occupied, and destined to be one of the largest in the country. The grounds comprise 300 acres. Poughkeepsie is connected in summer with New York and Albany by lines of steamers, and there is a steam ferry across the river to New Paltz. An important trade is carried on with the rural portions of Dutchess co., and the manufacturing interests are extensive. There are three iron founderies, two iron furnaces, a rolling mill, two ship yards and dry docks, several breweries, tanneries, and manufactories of agricultural implements, carpets, carriages, chairs, cooperage, cordage, dyestuffs, files, edge tools, glazed paper, gloves, hardware, pins, shoes, soap and candles, spring beds, &c. The city has six national banks, with an aggregate capital of $1,585,000, a savings bank, and an insurance company. It is divided into six wards, is governed by a mayor and 12 aldermen, and has a police force, fire department, and water works. The principal charitable institutions are St. Barnabas hospital, a home for the friendless, old ladies' home, and house of industry. There are good graded public schools, including a high school department, Eastman business college, and about 15 private schools and academies. Three daily and six weekly newspapers are published. The city library, free to all, contains about 8,500 volumes, and has good reading rooms. The young men's Christian association has also a large building, with reading rooms, &c., free to all. The number of churches is 20, viz.: 1 Baptist, 1 Congregational, 3 Episcopal, 2 Friends', 1 German Lutheran, 1 German Methodist, 1 Jewish, 4 Methodist Episcopal (1 colored), 1 Presbyterian, 2 Reformed, and 3 Roman Catholic (1 German).—Poughkeepsie was originally settled by several Dutch families in 1690–1700. In 1778 the legislature was convened by Gov. Clinton at the Van Kleeck house, a stone building pierced for musketry and used for defence, and among other acts gave its assent to the articles of confederation; and it was here on July 26, 1788, that the national constitution was ratified in the state convention assembled for its consideration. Poughkeepsie received a city charter in 1854. A railroad bridge over the Hudson here is projected.

POUILLET, Claude Gervais Mathias, a French physicist, born at Cuzance, Doubs, Feb. 16, 1791, died in Paris, June 15, 1868. He studied at the normal school in Paris, was successively a teacher there and in the collége Bourbon, and tutor of the sons of Louis Philippe. In 1829 he became professor of physical sciences at the conservatory of arts and industry, and he was chief director of that institution from 1831 till the *coup d'état* of Dec. 2, 1851. He was also elected to the academy of sciences. His *Éléments de physique expérimentale et de météorologie* (2 vols., Paris, 1827; 7th ed., 1856) served as the basis for J. H. J. Müller's celebrated *Lehrbuch der Physik und der Meteorologie* (2 vols., Brunswick, 1842). The best known of Pouillet's other publications is *Notions générales de physique et de météorologie* (1850; 3d ed., 1860).

POUJOULAT, Jean Joseph François, a French author, born at La Fare, Bouches-du-Rhône, Jan. 26, 1808. He was educated at the college of Aix, went to Paris in 1826, and assisted M. Michaud in preparing his *Bibliothèque des croisades*, and in 1830 accompanied him on a tour through the East, an account of which they published in their *Correspondance d'Orient* (7 vols., Paris, 1833–'5). He edited with Michaud the *Nouvelle collection des mémoires pour servir à l'histoire de France depuis le* 13^{e} *siècle jusqu'à la fin du* 18^{e} (34 vols. 8vo, 1836–'8). He has written histories of France from 1814, of the French revolution, and of Jerusalem; lives of St. Augustine (whose complete works he translated), Père Ravignan, Cardinal Maury, and Archbishop Sibour; travels in Algeria, &c.—His brother BAPTISTIN (1809–'64) wrote histories of Constantinople, of the popes, and of Richard Cœur de Lion, travels in the East, and other works.

POULPE. See OCTOPUS.

POUND (Lat. *pondus*, a weight), a measure of weight. Two different pounds are in use, one called the avoirdupois or commercial pound, equal to 7,000 grains, and the other the apothecaries' or troy pound, of 5,760 grains. (See AVOIRDUPOIS.)

POUND (Anglo-Sax. *pund*, a fold), in law, a pen, pinfold, or enclosure of any kind authorized by law and belonging to a town, city, or county, in which domestic animals that are wandering about, or trespassing, may be confined until claimed and taken out by the owner, by due process of law or in a lawful way. The practice of impounding stray or mischievous cattle is extremely ancient in England, and was adopted by the American colonies from their beginning. The whole process is carefully regulated by statutes in the United States, the provisions of which differ very much. In general they permit a sale of the property impounded for the cost of keeping, if it is not taken away and costs paid within a fixed time.

POUND STERLING, a denomination of money, originating from the pound weight of silver, which anciently was divided into 240 parts called pence. These pence were designated *esterling*, whence the name "sterling," the legal description of the English current coin. This is supposed by some writers to have been derived originally from Easterlings, the popular name of traders from the Baltic and from Germany, who visited London in the middle ages, and some of whom were probably employed in coining. By others it is supposed, perhaps with more probability, to be a diminutive of *star*, and in some old writers it is written *starling*, the penny being so called from the small star often stamped upon it. The pound sterling is a money of account; the gold coin representing it is called a sovereign, the current value of which in United States coin is now (1875) $4·8665.

POUPART, François, a French anatomist, born in Le Mans in 1661, died Oct. 31, 1709. He studied medicine at Paris and at Rheims, at which latter place he received his medical degree. His name has been connected by common consent with the fibrous band known as "Poupart's ligament," extending from the anterior superior spinous process of the ileum to the spine of the pubis, although it is generally conceded that his description of this structure was not remarkable for either originality or correctness. He became a member of the academy of sciences, and most of his works, mainly on subjects connected with anatomy and natural history, were published in the memoirs of that body.

POUSSIN. I. Nicolas, a French painter, born in Grand Andely, Normandy, in 1593 or 1594, died in Rome, Nov. 19, 1665. He belonged to an ancient but impoverished family of the French nobility, and was carefully instructed in literature and the sciences. He acquired the elements of his art from two French painters of moderate ability, but received his first ideas of style and composition from studying engravings of the works of Raphael and Giulio Romano. He visited Rome in 1624, and was presented to Cardinal Barberini. For several years after the departure of this prelate from the city he earned a bare subsistence by disposing of his pictures for trifling sums. His style was founded mainly on the antique; and so engrossing were his studies of the ancient statues that, as Sir Joshua Reynolds has observed, "he may be said to have been better acquainted with them than with the people who were about him." Fuseli said that "he painted basso rilievo." His "Death of Germanicus" and "Capture of Jerusalem by Titus," painted for Cardinal Barberini, first brought him into notice, and in 1639 Louis XIII. sent him a special invitation to France, made him his first painter in ordinary, with a pension, and lodged him in the Tuileries. The jealousy of rival artists rendered his life uncomfortable, and in 1642 he returned to Rome, where he lived quietly, absorbed in the practice of his art, and produced many large easel pictures which he readily disposed of at moderate prices. As a painter of history, classical mythology, or allegory, and of landscape, Poussin was one of the most remarkable and learned artists of his age; and his works, which are widely dispersed, are still held in great esteem. His historical works, according to Dr. Waagen, represent three distinct periods: the first, comprising his early residence in Rome, being distinguished by hardness of outline, thin coloring, and defective composition; the second, by excellence of composition and expressive heads; and the third, by an imitation of the antique which finally becomes mannered and monotonous. The Louvre contains a noble collection of his large historical pieces, including "The Deluge," "The Rape of the Sabines," "Eliezer and Rebecca," "The Finding of Moses," "Christ appearing at the Prayer of St. Francis Xavier and healing a Japanese Woman," which Waagen calls the best of all his altarpieces, and "Christ healing the Blind Man of Jericho," which according to the same authority is the most satisfactory of his later works. In the same collection are his celebrated *Et in Arcadia Ego* and "Eurydice bitten by the Serpent." The Louvre also contains the series of "Four Seasons," painted during the last five years of his life. In the British national gallery are some of the finest of his purely classical or mythological subjects, one of which, "The Dance of the Bacchanals," reflects so completely the spirit of antique sculpture that it might have been copied from the bass reliefs of a Grecian urn. But the most celebrated of Poussin's works in England are the two sets of "The Seven Sacraments" in Belvoir castle and the Bridgewater gallery. In the latter collection is also a fine picture of "Moses striking the Rock," and in that of Mr. Miles at Leigh Court the well known "Plague of Athens." Scattered throughout his works are also pieces from sacred and profane history of much sweetness of tone and expression; "a proof," observes Mrs. Jameson, "that Nicolas Poussin could be, when he chose, a poetical and effective colorist." On the other hand, he could descend to the most revolting treatment of a subject, as in his "Martyrdom of St. Erasmus" in the Vatican, in which the entrails of the saint are in the act of being wound out of his body by a windlass around which they are twisted. His landscapes are commonly embellished with ancient architecture or figures taken from classical mythology and history, and present excellent specimens of what is called the "heroic" style of this department of painting. **II. Gaspar**, brother-in-law of the preceding, born in Rome in 1613, died there in 1675. His family name was Dughet, but after the marriage of Nicolas Poussin with his sister, he was adopted by Nicolas, who had no children, and assumed his name. Under the instruction of his brother-in-law he became very eminent in the department of landscape and in ideal pictures. He improved his color by studying the works of Claude Lorraine. His peculiar skill in aërial effects was shown in his land storms, of which a well known example, representing Dido and Æneas taking refuge from the tempest in a cave, is in the British national gallery. In the same collection is a landscape entitled "Abraham and Isaac going to the Sacrifice," which has been called the painter's masterpiece.

POWELL, an E. county of Kentucky, intersected by Red river, a tributary of the Kentucky; area, about 300 sq. m.; pop. in 1870, 2,599, of whom 239 were colored. The surface is hilly and the soil productive. The chief productions in 1870 were 2,105 bushels of wheat, 88,022 of Indian corn, 5,080 of oats, 30,287 lbs. of butter, and 252 tons of hay. There were 458 horses, 1,475 cattle, 1,851 sheep, and 2,549 swine. Capital, Stanton.

POWELL, Baden, an English author, born in London in 1796, died there, June 11, 1860. He graduated at Oxford in 1817, and from 1827 till his death was Savilian professor of geometry in that university. He was in holy orders, but held no living. His writings are either strictly scientific, or treat of the connection between science and theology. Among the former are a "History of Natural Philosophy" (1834); "A General and Elementary View of the Undulatory Theory of Light" (1841); and a large number of papers in the transactions of various scientific societies, of which the most remarkable were "Reports on Luminous Meteors," "On the

Repulsive Power of Heat," "On the Dispersion of Light," "On Elliptic Polarization of Light," and "On Irradiation." Of the second class are "The Connection of Natural and Divine Truth, or the Study of the Inductive Philosophy considered as subservient to Theology" (London, 1838); "Essays on the Spirit of the Inductive Philosophy, the Unity of Worlds, and the Philosophy of Creation" (1855; 2d ed., 1856); "The Order of Nature considered with reference to the Claims of Revelation" (1859); and "On the Study of the Evidences of Christianity," in "Essays and Reviews" (1860). The purpose of the works of the latter class was to maintain that the rejection of ideas generally prevalent upon theological subjects, which in the progress of modern science have been called in question, or at least modified, is in no way a hindrance to a sincere belief in the cardinal truths of religion.

POWELL, John Wesley, an American geologist, born at Mt. Morris, N. Y., March 24, 1834. In 1842 the family removed to Wisconsin, where he received a common school education, and at the age of 16 became a teacher. At the age of 20 he entered Oberlin college, Ohio, which he left after two years to study geology. He spent four summers in travel through the western states, collecting plants, animals, and fossils. In 1861 he entered the army as a volunteer, and at the battle of Shiloh lost his right arm. He subsequently rose to the rank of major of artillery, and was actively engaged in the Vicksburg and Atlanta campaigns and in the battle of Nashville. In 1865 he became professor of geology in the Wesleyan university at Bloomington, Ill. In 1867 he organized a scientific expedition to Colorado territory, and repeated it in 1868. Congress having authorized him to explore the Colorado river and the adjoining country, he organized a small party and navigated it through the entire length of its immense cañons. Since that time Prof. Powell has been engaged in a general scientific survey of the region drained by the Colorado and its tributaries, including a topographical survey by triangulation, its geology, zoölogy, botany, and ethnology. His researches into the languages, habits, and traditions of the Indians of Utah have been especially important. He is at present (1875) chief of the second division of the geographical and geological survey of the territories, under the interior department.

POWER, in law, an authority by which one is enabled to exercise the control of an owner over the property of another. The term is important in real estate law, where powers are variously classified with reference to their origin and incidents. They may be created by deed, will, or other instrument executed by the owner of the land, as where one by will empowers his executor to sell or mortgage lands for the purpose of raising portions for children, or by letter of attorney constitutes another his agent to make sales; or they may result from legal proceedings, or be conferred upon officials by statute for the purpose of enforcing some public right or private remedy. A common instance of a statutory power is the authority to make sale of lands for the nonpayment of taxes. Powers also are "naked," or disconnected from any interest in the land, or they are coupled with an interest, by which is meant that the donee of the power has an interest not in the execution of the power merely, but in the property in respect to which the power is created. Thus an attorney to sell lands has a naked power, though he may be benefited by its execution; but a mortgagee in a mortgage which contains a power of sale has a power coupled with an interest. The distinction is important, as in general the donor of a naked power may revoke it at any time, and his death (except where it is given by will) or his bankruptcy will revoke it. Powers are again classified as those which have effect under common law rules, and those deriving their force from the statute of uses. A power of the latter class is an authority to cause a use with its accompanying estate to spring up or shift from one person to another at the will of the person invested with it. These are sometimes made use of in family settlements, as a means of providing for events and contingencies which cannot be fully foreseen, and they may or may not indicate the beneficiary. If they do not, the donee may designate whomsoever he shall please, or abstain altogether; but if they do, they are powers in trust, and equity may compel the execution. A power is to be executed as provided by the instrument creating it, if provision be made therein; and a common law power not coupled with an interest is to be executed in the name of the donor of the power, except when given by will.

POWER, Tyrone, an Irish actor, born in county Waterford in 1795, perished at sea in 1841. His mother, left a widow during his infancy, removed to Glamorganshire, South Wales, and in the theatre of the neighboring town of Cardiff Tyrone made his début as Romeo. For several years he performed at provincial theatres, attempting both comic and pathetic parts. In 1818 he retired from the stage, but in 1821 reappeared in London. His first decided success in the metropolis was achieved in 1824 in the part of Paddy O'Halloran, and thenceforth he was unrivalled in Irish characters. To a prepossessing personal appearance he united a vivacious air, a genuine appreciation of Irish humor, a rich brogue, and a fine taste for singing. His personations of the "Irish Tutor," Rory O'More, Murtoch Delany, "Teddy the Tiler," Sir Patrick O'Plenipo, and Phelim O'Flannigan, written expressly for him, were among the triumphs of the comic stage. In 1833 and in 1840 he visited the United States. He embarked for Europe, March 11, 1841, in the steamship President, which was never heard of. He published "Impressions of America" (2 vols. 8vo, London, 1835); "The King's Secret," a novel; "The Lost Heir," &c.

POWERS, Hiram, an American sculptor, born in Woodstock, Vt., July 29, 1805, died in Florence, Italy, June 27, 1873. He passed his youth on his father's farm, and emigrated with the family to Ohio; and on the death of his father soon afterward he settled in Cincinnati, where he was first a clerk, and then an apprentice to a clockmaker. Learning from a German sculptor the art of modelling in clay, he made some busts and medallions of considerable merit, and for seven years had charge of the waxwork department of the western museum at Cincinnati. In 1835 he went to Washington, where he was for some time employed in modelling busts of distinguished men. With the assistance of Nicholas Longworth of Cincinnati, he was enabled in 1837 to visit Italy, and settled in Florence, which continued to be his home till his death. He at first devoted himself chiefly to modelling busts; but in 1838 he produced an ideal statue of Eve, which Thorwaldsen pronounced a masterpiece. A year later he finished the model of his "Greek Slave," his most widely known work, of which at least six duplicates in marble have been made, besides casts and reduced copies. Among other well known works by him are the "Fisher Boy," of which three repetitions in marble have been produced; "Il Penseroso;" "Proserpine," a bust; "California;" "America," modelled for the crystal palace at Sydenham, England; and portrait statues of Washington for the state of Louisiana, of Calhoun for South Carolina, which has been called his best work of the kind, and of Webster for Massachusetts. Of his busts, which comprise much the greater part of his works, those of Adams, Jackson, Webster, Calhoun, Chief Justice Marshall, Everett, and Van Buren are well known and striking specimens. His latest ideal productions are "The Last of his Tribe," a statue of an Indian maiden, and a "Head of Jesus Christ." Powers invented a process of modelling in plaster which, by obviating the necessity of taking a clay model, expedites the labor of the sculptor.

POWERS, Mechanical. See MECHANICS.

POWESHIEK, a S. E. county of Iowa, drained by the north fork of Skunk river, which crosses the S. W. corner, and by English river and other streams; area, 576 sq. m.; pop. in 1870, 15,581. It has a fertile soil. The Chicago, Rock Island, and Pacific, and the Central Iowa railroads pass through it. The chief productions in 1870 were 709,726 bushels of wheat, 1,435,557 of Indian corn, 189,362 of oats, 78,987 of potatoes, 286,630 lbs. of butter, 28,127 of wool, and 22,783 tons of hay. There were 7,064 horses, 5,223 milch cows, 9,710 other cattle, 8,395 sheep, and 25,102 swine; 7 manufactories of carriages and wagons, 4 of saddlery, and 3 flour mills. Capital, Montezuma.

POWHATAN, an E. county of Virginia, bordered N. by the James river and S. by the Appomattox; area, about 300 sq. m.; pop. in 1870, 7,667, of whom 5,115 were colored. It has a level surface and a naturally fertile soil. The Richmond, Danville, and Piedmont railroad passes the S. E. border. The chief productions in 1870 were 70,804 bushels of wheat, 74,896 of Indian corn, 72,046 of oats, 541,430 lbs. of tobacco, and 5,541 of wool. There were 628 horses, 447 mules and asses, 982 milch cows, 1,405 other cattle, 2,070 sheep, and 3,554 swine. Capital, Powhatan Court House.

POWHATAN, an American Indian sachem, born about 1550, died in Virginia in April, 1618. His original name was Wahunsonacock, the name Powhatan being that of his early residence near the falls of the James river, on the present site of Richmond. He raised himself from the rank of a chieftain to the command of 30 tribes, which numbered about 8,000 souls. His dominions included the country between the rivers James and Patuxent, and in the interior as far as the falls of the chief rivers. After the extension of his power, he resided principally at Werowocomoco, on York river, in the present county of Gloucester. When the first expedition under Newport and Smith visited him at Powhatan, he treated them with hospitality. Subsequently Smith, according to his own story, was taken prisoner, and was about to be despatched when Powhatan, through the intervention of his daughter Pocahontas, spared his life, and ultimately sent him to Jamestown with strong protestations of regard. Recent investigations have thrown discredit upon this tale. When Newport subsequently returned to Virginia from England, he brought several presents, one of which was a crown, and the ceremony of coronation was performed a few days later. For the honor shown him, Powhatan gave Newport his mantle and old shoes. Captain Smith afterward made an unsuccessful attempt to capture the "emperor" in order to obtain a supply of corn; and in revenge Powhatan prepared to attack the English by night, but was foiled by the watchfulness of Pocahontas. The quarrels between Powhatan and the English did not cease until the marriage of his daughter with Rolfe, after which he was their firm friend.

POWNALL, Thomas, an English statesman, born in Lincoln in 1722, died in Bath, Feb. 25, 1805. He emigrated to America in 1753, and in 1757 was appointed governor of the colony of Massachusetts Bay. He was recalled at his own request, and succeeded Sir Francis Bernard as lieutenant governor of New Jersey in 1760, and soon afterward became governor of South Carolina. In 1761 he returned to England, was made comptroller general of the expenditures of the army in Germany, and in 1768 was elected to parliament. He earnestly opposed the measures of the government against the colonies. After being three times returned to parliament, he retired in 1780, and passed the remainder of his life in antiquarian studies. He was the author of a great number of works, including "Principles of Polity" (1752); "Administration of the Colonies" (1764); "Description of the Middle States of America" (1776); "A Memorial to the Sovereigns of Europe on the State of Affairs between the Old and the New World" (1780); "A Memorial to the Sovereigns of America" (1783); "Notices and Descriptions of the Antiquities of the Provincia Romana of Gaul" (1788); and "Intellectual Physics" (1795).

POZZO DI BORGO, Carlo Andrea, count, a Russian diplomatist of Corsican origin, born at Alata, near Ajaccio, March 8, 1764, died in Paris, Feb. 15, 1842. He completed his studies at the university of Pisa, and became an advocate at Ajaccio. His intimacy with the Bonaparte family came to an end in 1790, when he became a follower of Paoli. He represented Corsica in the French legislative assembly in 1791-'2, but the discovery of a letter addressed by him to Louis XVI. obliged him to return to Corsica, where he was associated with Paoli in governing the island under English protection, and became president of the council and secretary of state. In October, 1796, after the expulsion of the British, he fled to England. In 1798 he went to Vienna to effect a coalition between Austria and Russia against France, accompanied Suvaroff in his campaign of 1799, and in 1803 entered the Russian service as councillor of state. As commissioner he was despatched in 1805 to the Russian, English, and Neapolitan army in Italy, and subsequently on various missions to Prussia and Austria. On account of the friendly relations entered into by Alexander and Napoleon, Pozzo left the Russian service in 1808, but reëntered it after the close of the campaign of 1812. His whole influence was constantly exerted to keep Alexander steadfast in the war against France, and to gain Sweden for the allies, in which he succeeded. In the beginning of 1814 he went to London to secure the active coöperation of England, strenuously advocated the occupation of Paris, and in the congress of Châtillon opposed accepting the offers of Napoleon. After the abdication of the emperor he was made Russian commissioner to the provisional government of France, attended the congress of Vienna, and afterward was ambassador at the French court. He was slightly wounded at the battle of Waterloo. After the second restoration he was offered by Louis XVIII. the post of minister of the interior, but declined it, and as Russian ambassador signed the treaty of Paris in 1815. In 1823 he went on a mission to Madrid, and after the accession of Nicholas in 1825 was created a count. He was ambassador at Paris when the revolution of 1830 broke out, and on the arrival of the news of the fall of Warsaw in September, 1831, the populace came near storming his residence. Subsequently he was ambassador in London till 1839, when he retired. He was never married.—See *Notice biographique sur le comte Pozzo di Borgo*, by Vuhrer (Paris, 1842).

POZZUOLANA, a reddish, porous volcanic mineral found near Pozzuoli, between Rome and Naples, and in other countries in the neighborhood of volcanoes. The catacombs of Rome were excavated in a large deposit of this argillaceous sand, and it has been found in Sardinia, in the south of France, and in Rhenish Prussia near Andernach, where it is called *trass*. It is mainly a dehydrized silicate of alumina with other earths and alkalies, formed by the pouring of basaltic lava floods over argillaceous beds, or by similar natural processes. According to Berthier, the composition of Italian pozzuolana and the German trass is as follows:

CONSTITUENTS.	Pozzuolana.	Trass.
Silica	44·5	57·0
Alumina	15·0	12·0
Lime	8·8	2·6
Magnesia	4·7	1·0
Oxide of iron	12·0	5·0
Potash	1·4	7·0
Soda	4·0	1·0
Water and loss	9·6	14·4
Total	100·0	100·0

Pozzuolana and trass are used for the preparation of hydraulic cements in the countries where the deposits are found, and are also exported. Their adaptability to the making of cements arises from the fact that the silica is in a condition to be easily acted on by calcic hydrate with which it is mixed, and also from its containing alkalies and oxide of iron, all of which unite in forming a mass which hardens in water. (See CEMENT.)

POZZUOLI (anc. *Puteoli*), a town of Italy, on a bay of the same name, in the province and 6 m. W. of the city of Naples; pop. about 10,000. It is celebrated for its antiquities, which comprise an amphitheatre, one of the largest of its kind; a Serapium, or temple of Serapis; the upper part of a temple of Neptune; a temple of Diana, consisting of a bathing hall; the villa Licastro, called the temple of Antinoüs after the statue discovered there; and ruins believed to be those of Cicero's villa. In the vicinity are many vestiges of ancient roads, covered with ruined tombs. About 1 m. N. E. of Pozzuoli is the Solfatara (anc. *Forum Vulcani*), the crater of a semi-extinct volcano. Aluminous waters springing from Mount Siccino, and known as the *Pisciarella*, are regarded as identical with the mineral springs of antiquity.—The ancient Puteoli was a Campanian city of Greek origin, which despite the distance from Rome virtually constituted its most useful harbor. Before Roman times, merchants of Tyre had establishments there; the natural advantages of the situation, and the protection of the harbor by a still visible mole, made Pozzuoli a great centre of trade and navigation. It was at the same time a favorite resort, like Baiæ on the opposite side of the bay, and prospered until after the reign of Honorius. Wars and repeated volcanic eruptions in the 12th and 16th centuries finally extinguished the importance of the place.

PRADIER, Jean Jacques, a French sculptor, born in Geneva, May 23, 1792, died near Paris, June 4, 1852. He belonged to a family which had left France after the revocation of the edict of Nantes, was sent to Paris while yet a boy, studied under the sculptor Lemot, and received from Napoleon a small pension. He gained a gold medal when 21 years of age, and the next year obtained by his "Philoctetes at Lemnos" the great prize of sculpture, which entitled him to a residence of four years in Italy at the expense of the government. At the exhibition of 1819 a gold medal was awarded to him, and in 1827 he was elected a member of the academy of fine arts, to fill the seat left vacant by his master Lemot. Among the most admired of his works are "Psyche," the "Three Graces," "Cyparissus," "Venus and Cupid," "The Bacchante and the Satyr," "Phryne," *La poésie légère* and the two muses which adorn the fountain of Molière in Paris, "Industry" in the Paris exchange, "Liberty" in the former chamber of deputies, "Phidias" in the Tuileries garden, and statues of saints in several Paris churches.

PRADT, Dominique Dufour, abbé de, a French author, born at Allanches, Auvergne, April 23, 1759, died March 18, 1837. On the breaking out of the revolution he was vicar general of the archbishop of Rouen, was elected by the clergy of Normandy deputy to the states general, sided with the royalists in the constituent assembly, and in 1791 fled to Hamburg, where in 1798 he published anonymously a pamphlet entitled *L'Antidote au congrès de Rastadt, ou Plan d'un nouvel équilibre européen.* In another anonymous tract, *La Prusse et sa neutralité* (1800), he urged a coalition of Europe against the French republic. He returned to France in 1801, when his *Trois âges des colonies* (3 vols. 8vo) appeared. Through the means of his relative Gen. Duroc, he was, in December, 1804, appointed almoner to the emperor, received the title of baron, and became bishop of Poitiers. In 1808 he accompanied Napoleon to Bayonne, was instrumental in bringing about the abdication of Charles IV. of Spain, and was rewarded by a handsome gratuity and the archbishopric of Mechlin. In 1812 he was appointed minister at Warsaw; but having failed to fulfil the intentions of the emperor, he was disgraced, deprived of his office of grand almoner, and sent to his diocese. On the invasion of France by the combined armies of Europe, he hastened to Paris to join the Bourbons, and after the battle of Waterloo published his *Histoire de l'ambassade dans le grand duché de Varsovie en* 1812, in which he violently denounced the conduct of the ex-emperor, and which passed through nine editions. His zeal for the Bourbons however was received with coolness, and having been obliged to resign his archbishopric, in which he had not been confirmed by the pope, he retired to his estate in Auvergne, and published a number of political works of no permanent importance. He was elected to the chamber of deputies by the department of Puy-de-Dôme in 1827, but resigned in 1828, and died in obscurity.

PRAED, Winthrop Mackworth, an English poet, born in London in 1802, died July 15, 1839. He was educated at Eton and at Trinity college, Cambridge, obtaining an unprecedented number of prizes for Greek odes and epigrams, and for English poems. He graduated in 1825, was called to the bar in 1829, and in 1830 and 1831 was returned to parliament for St. Germain in Cornwall as a conservative. In 1834 he was appointed secretary of the board of control, and in 1835 he was returned for Great Yarmouth. He was afterward member for Aylesbury and recorder of Barnstaple. His sister, Lady Young, prepared a complete edition of his poetical works, with a memoir by the Rev. Derwent Coleridge (2 vols., 1864).

PRÆNESTE (now *Palestrina*), an ancient city of Latium, on a spur of the Apennines, 23 m. E. S. E. of Rome. It is first mentioned in history in the list of cities of the Latin league given by Dionysius. Its great power, arising partly from its almost impregnable position, gave it importance in the early wars of Italy. Originally opposed to Rome, it formed an alliance with that republic about 499 B. C., but a century later became engaged in a war with it. In 380 its inhabitants marched to the gates of Rome, and were routed with great slaughter on the banks of the Allia by T. Quintius Cincinnatus, who took eight towns subject to Præneste, and compelled the city to submit. In 340 Præneste was a conspicuous member of the Latin league against Rome; but the defeat of the combined forces by L. Camillus at Pedum in 338 put an end to the war, and by the terms of the peace which followed the city was deprived of a part of its territory. It retained a nominal independence until the end of the social war, when the inhabitants received the Roman franchise. During the civil war between Marius and Sulla it was one of the chief places in the hands of the Marian party. Sulla captured it, massacred the inhabitants, demolished its fortifications, and planted a military colony on its territory. During the empire it was a place of summer resort for the Romans, and was also much visited on account of its temple of the goddess Fortune, the seat of a favorite oracle. Its answers were made by the *sortes Prænestinæ*, consisting of sticks of oak inscribed with ancient characters, which being shaken up, one was drawn for the person consulting the goddess. During the middle ages Præneste was the stronghold of the Colonna family. It was taken by Pope Boniface VIII., who dismantled the fortifications and razed the buildings to the ground. It was rebuilt in 1307, and resisted an attack of Rienzi, but in 1436 was captured by Cardinal Vitelleschi, who in 1437 destroyed it. In 1448 it was again rebuilt by the Colonnas. In 1630 it was sold by Francesco Colonna to Carlo Barberini, brother of Urban VIII., for 775,000 scudi. Among the ruins of the old city many statues and other valuable remains of antiquity have been discovered, including a celebrated mosaic.

PRÆTOR (Lat. *præire*, to lead), the title of a Roman officer whose duties were chiefly judicial, and also, according to Cicero, that of the consuls as leaders of the Roman armies. The office was first created in 366 B. C., when the consulship was divided between the patricians and plebeians, and it was given to the former as an indemnification; it was not held by a plebeian till 337. It was a kind of third consulship, the prætor being called the colleague of the consuls, and appointed in the *comitia centuriata* with the same auspices. When the consuls were absent from Rome, he exercised their functions. He was a curule magistrate, and had the *imperium*, although subject to the consuls, between whom and himself there was also the difference that he was attended by only six lictors. Originally the prætor was a consul of the preceding year, and after the admission of plebeians to the office it was filled for some time alternately by the patrician and plebeian consul of the preceding year. In 246 another magistracy, that of *prætor peregrinus*, was created with the special duty of deciding disputes between foreigners and between citizens and foreigners; and in distinction from him who filled this office, the other prætor was called *prætor urbanus*. These two, after their election, decided by lot which of the two magistracies should be filled by each; and if one of them departed from the city at the head of an army, the other discharged his duties. After the extension of the Roman power beyond the limits of Italy and the formation of provinces, prætors were sent to govern them. Under Sulla the number of prætors was raised to 8; under Julius Cæsar successively to 10, to 12, to 14, to 16; under Augustus it varied, but was finally fixed at 12; and under Tiberius it rose again to 16. By Claudius two prætors were created for matters of *fidei commissa*, but Titus reduced the number to one; another was created by Nerva with the duty of deciding questions between the *fiscus* and individuals. At all times the *prætor urbanus* was the first in position, and was specially spoken of as the prætor. He was the chief magistrate for the administration of justice, and could not be away from Rome for more than ten days at a time. His duty also was to superintend the *ludi Apollinares*. He, along with the *prætor peregrinus*, had the right of issuing edicts, and these edicts were one of the sources of Roman law, under the title of *jus honorarium* or *prætorium*. Under Hadrian these edicts were collected and arranged by Salvius Julianus, and entitled *edictum perpetuum*. After the reign of that emperor they no longer exercised the right, but they existed long afterward.

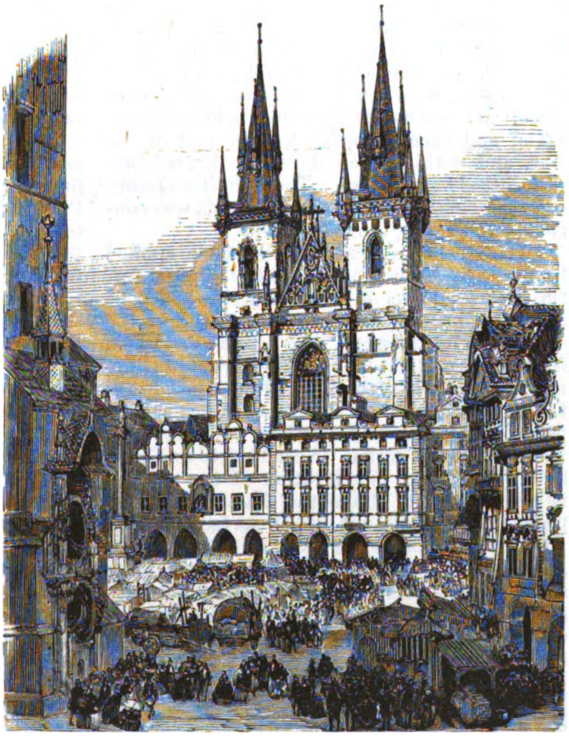
PRÆTORIANS, or **Prætorian Cohorts,** a Roman body guard, named in imitation of the cohort said to have been formed by Scipio Africanus out of his bravest troops. Their number increased during the civil wars, and by Augustus they were established as a separate force, of nine cohorts, each containing 1,000 men. Three cohorts he stationed in Rome, retaining the others in the adjacent towns. But Tiberius assembled them all at Rome in a permanent fortified camp, and Vitellius increased the number of cohorts to 16. They received double pay. Their term of service was at first 12 years, but at a later period 16, and at the end of the term each soldier received 20,000 sesterces. All the prætorians were entitled to carry the same insignia of rank with the centurions. They became very influential in the imperial succession, and received large donations from each emperor at his accession; and in A. D. 193, having assassinated Pertinax, who attempted reforms, they even put the empire up for sale. Upon the accession of Septimius Severus in the same year, they were disbanded and banished from the city. Severus afterward restored them with a new organization, increasing their number fourfold, and recruiting them, not as formerly from Italy only, but from the bravest soldiers of the frontier legions. Upon the removal of the seat of the emperor from Rome they ceased to guard his person. They were increased by Maxentius, but were defeated with him in 312 by Constantine, who entirely suppressed them.

PRAGA, a suburb of Warsaw, Poland, on the opposite bank of the Vistula. Here in 1656 the Poles were defeated by Charles Gustavus of Sweden. In the insurrection of 1794, Kosciuszko having been defeated and made prisoner in the battle of Maciejowice, the dispirited and disorganized remnants of the Polish army defended the ramparts of Praga against the victorious Russian forces under Suvaroff. On Nov. 3 the Russian general ordered an assault, and after a fierce struggle at dawn on the 4th the ramparts were carried, more than 15,000 Polish soldiers being slain, drowned in the Vistula, or taken prisoners, and an almost equal number of unarmed inhabitants of Praga, of every age and sex, brutally massacred. In the evening a fire arose, which destroyed a large part of the place. The vicinity of Praga was the principal seat of the Polish war in 1831.

PRAGMATIC SANCTION (Gr. πράγμα, a deed or act), a state ordinance decreed by the monarch or legislature. The phrase seems to have originated with the Byzantine monarchs, but was early introduced into France, and is now applied to several state decrees which have become historical. **I.** The ordinance of Louis IX. (St. Louis) in 1269, by which the liberties of the Gallican church were established. **II.** That of Charles VII. of France, proclaimed at Bourges in 1438, confirming the decrees of the council of Basel, and thereby authorizing the election of bishops by cathedral chapters, &c.

It was abandoned by Louis XI., but after his quarrel with the pope it had again the force of law until in 1516 Francis I. substituted for it his concordat with Leo X. **III.** The ordinance confirming the decrees of the same council, adopted in Germany in 1439 by the diet of Mentz. It was abandoned in 1448 by Germany in consequence of negotiations with Pope Nicholas V. **IV.** The instrument by which the emperor Charles VI., of the house of Hapsburg, in default of male heirs, endeavored to secure the succession in his Austrian dominions to his heirs of the female line. This ordinance was ratified by the estates of the principal countries subject to the Austrian crown, and by most of the sovereignties of Europe from 1720. In consequence of this, Charles's daughter Maria Theresa, wife of Francis of Lorraine, ascended the throne on his death in 1740. The attack of Frederick the Great of Prussia on the Austrian province of Silesia was the signal for a violation of the instrument and for a general war throughout Europe. **V.** The instrument by which Charles III. of Spain, in 1759, settled the right of succession to the throne of the Two Sicilies upon his third son and his descendants.

PRAGUE (Boh. *Praha*, Ger. *Prag*), a city of the Austro-Hungarian monarchy, capital of Bohemia, on the Moldau, 155 m. N. W. of Vienna; lat. 50° 5′ N., lon. 14° 25′ E.; pop. in 1870, 157,713, of whom about 90,000 were Czechs and the rest Germans and Jews (inclusive of suburbs, 189,949). It is situated in a picturesque valley, surrounded by hills. The Moldau, spanned by the massive Charles bridge of the 14th century, with a monument of St. John Nepomuk, and by other bridges, and embracing in its course several islands, flows through the city from S. to N. On the E. bank are the Altstadt, or old town, the principal business quarter; the Neustadt, or new town; and the Josephstadt, which is almost exclusively inhabited by Jews. On the left bank are the Hradschin, with many edifices of historic interest, among them the former palace of the Bohemian kings, and the Kleinseite, which contains the diet house, the principal government buildings, and many palaces belonging to the nobility, including the Waldstein or Wallenstein palace. Outside of the city wall, which is 12 m. in circumference, and provided with eight gates, are the suburbs of Karolinenthal and Smichow, a manufacturing centre, and the ancient acropolis or Wysehrad. The city has fine squares and streets, many Catholic and several Protestant churches, and 10 synagogues, one of them, a small Gothic building, the oldest in Europe. Its numerous domes and turrets give Prague a semi-oriental appearance. The cathedral, in the Hradschin, contains the shrine of St. John Nepomuk, ornamented with about 37 cwt. of silver, and a mausoleum erected by Rudolph II.; its belfry is over 300 ft. high. The Theinkirche, in the Altstadt, said to have been founded in 880, contains the tomb of Tycho de Brahe. The university of Prague, established in 1348 by Charles IV., after the model of that of Paris, was attended early in the 15th century, when Huss lectured there, by 20,000 students. In 1873 it had 154 professors and 1,811 students, of whom 1,178 were Czechs. It comprises departments of theology, philosophy, law, and medicine, an observatory, a botanic garden, and various other institutions and collections. There are two polytechnic institutions, one German with 39 professors and 451 students, and one Czech with 45 professors and 713 students. In 1874 the library of the university had upward of 140,000 volumes. The collection of books in the Strahow monastery numbers 50,000 volumes, and those in the Lobkowitz and Kinsky palaces respectively 70,000 and 40,000. The principal manufactures are cotton and linen goods, machinery, leather, and glass.—The origin of Prague is obscure, but a portion of it was probably built in the 8th century. It has


The Theinkirche.

suffered greatly from the ravages of war, particularly during the Hussite contests. It witnessed the first outbreak of the thirty years' war in 1618, and in 1620 the battle which ruined the fortunes of the elector palatine Frederick was fought (Nov. 8) near its gates at the foot of the White mountain. In 1631 the city was taken by the elector of Saxony, and in 1632 retaken by the imperialists under Wallenstein. The Swedes gained possession of the Kleinseite in 1648, but evacuated it in the same year upon the conclusion of the peace of Westphalia. Prague was taken by the French and Bavarians in 1741. In 1744 it was reduced by Frederick the Great after a severe bombardment, but restored by the peace of Dresden in the next year. The same monarch defeated the Austrians before the city on May 6, 1757. In June, 1848, it was the seat of the Slavic congress, and the scene of a national Bohemian outbreak, when a desperate contest took place. Windischgrätz, however, held the Hradschin, and thence bombarded the rest of the city, and within a few days the insurrection was entirely put down. The definitive treaty of peace between Prussia and Austria was concluded at Prague, Aug. 23, 1866.

PRAIRIE (Fr., a meadow), the name applied by the early French explorers to the great fertile, treeless plains of North America which lie between Ohio and Michigan on the east and the arid plains on the west. The region over which they mainly extend is the western part of Ohio, nearly the whole of Indiana, Illinois, and Iowa, the southern part of Michigan, the northern part of Missouri, and portions of Wisconsin, Kansas, and Nebraska. Near Prairie du Chien in W. Wisconsin, the elevation of the prairies is about 400 ft. above the Mississippi. At Cairo in S. Illinois, the upper surface is from 100 to 250 ft. above the river, or 400 to 550 ft. above the sea. In the central portion of the state, near the Illinois Central railroad, the average elevation is from 650 to 750 ft. above the sea, and near the northern border of the state this increases to 800 or 900 ft., and some of the highest swells of the prairie are 1,000 ft. high. In S. Wisconsin the more elevated portions of the prairie are about 1,100 ft. above tide water. In Iowa the *plateau du coteau des prairies* of Nicollet, dividing the waters of the Mississippi from those of the Missouri, is from 1,400 to 1,500 ft. above the sea. On the head waters of the Illinois and Wabash, and S. and W. of Lake Michigan, the prairies are very level and smooth, and are termed flat. Those of other regions, where the surface is undulating and broken by the depressions of the streams, are known as rolling prairies. The characteristic herbs of the prairies, as described by Prof. Gray in a paper on the "Flora of the Northern States," published in the "American Journal of Science" (2), xxiii., p. 397 (1857), would seem to be *compositæ*, especially helianthoids of many species. Trees are met with upon the prairies under peculiar circumstances of moisture and soil, in scattered groups, called groves, or along the larger streams, or occasionally on low rocky ridges. West of the Mississippi they become less frequent, and near lon. 98° W. they disappear altogether. The soil of the prairies is generally free from stones. In the swales and in some of the bottom lands the rich black vegetable mould is very deep, but on the upper prairies its depth is usually from one to two feet. The subsoil is almost invariably an argillaceous loam, more or less mixed in its lower portions with sand and occasional pebbles. The total thickness of clay, sand, and loam amounts in some places near the larger rivers to 200 ft.; but the rock is often found in other places very near the surface; its immediate cover consists of layers 2 or 3 ft. thick of angular fragments. Water is generally found in the sandy stratum 15 to 30 ft. below the surface. Throughout the prairie region the underlying rocks are soft sedimentary strata, especially shales and impure limestones. Most of these on exposure disintegrate readily and crumble to soil. To the finely comminuted condition of these materials Prof. Hall ascribes the treeless character of the prairies.—The vast plains lying between the 99th and 104th meridians, and reaching from the Big Horn mountains on the north to the Llano Estacado on the south, differ from the prairies in being arid and partly desert, although irrigation generally renders them very fertile. The mound prairies near Puget sound, and in other parts of the Pacific coast, are so called because they are thickly studded with earth mounds, generally 3 or 4 ft. high and 30 to 40 ft. in diameter at the base. Prof. Joseph Le Conte holds them to be the result of surface erosion under peculiar conditions.

PRAIRIE, a central county of Arkansas, bounded E. in part by White river, which also intersects it, and N. by Cypress bayou, one of its branches, and intersected by bayou Metoe; area, 1,050 sq. m.; pop. in 1870, 5,604, of whom 1,811 were colored. The Memphis and Little Rock railroad passes through it. The chief productions in 1870 were 81,618 bushels of Indian corn, 3,332 bales of cotton, 2,130 tons of hay, 11,335 lbs. of tobacco, and 70,850 of rice. There were 537 horses, 983 milch cows, 1,610 other cattle, and 4,680 swine. Capital, Devall's Bluff.

PRAIRIE DOG (*cynomys*, Raf.), a genus of American rodents, intermediate between the marmots and the spermophiles or prairie squirrels. The cheek pouches are very rudimentary; the eyes large, and the ears very short; five distinct claws on all the feet, those on the fore feet much the largest; the body thick and low, the feet large, and the tail short and thinly haired; the skull short and very broad, with the zygomata strongly convergent anteriorly; molars very large, arranged in curves, strongly divergent anteriorly, and near together behind. The common prairie dog (*C. Ludovicianus*, Ord) is about 13 in. long, with the tail 4 in. more; the color above is reddish or cinnamon brown, with lighter tips to the hairs and a few black ones intermixed; beneath, brownish white or yellow; tail like the back, with a black tip; in winter the color above is more grayish; the hind soles have a hairy patch. This woodchuck in miniature is abundant on the plains west of the Missouri river, extending as far north as the limits of the United States, and south to lat. 30° N.; it is confined to the prairies, and feeds on plants and occasionally on insects. Prairie dogs live in society, hundreds in the same district, their numerous burrows placed close together, and sometimes extending over a space of miles, meriting the common name of dog towns or villages; around the mouth of the burrows the earth is heaped up to a height of about 18 in., from the top of which the occupants can survey what is going on in the community; their burrows are so deep and extensive, that riding among them is often dangerous to horses' limbs; fond of standing erect at the mouth of their burrow, and rarely going a great distance from it, they retreat in a comical tumbling manner at the least sign of danger, after a short time peeping out again. They feed chiefly at night, are very shy, and when shot, unless killed outright, almost always manage to get into their holes; they are active, playful, very prolific, and from their habitat as yet not injurious to vegetation; their flesh is tender, fat, and juicy. In the northern districts they hibernate. The prairie dog was probably so named from the sharp tone of its chatter, somewhat resembling the yelp of a small dog, as it bears no external resemblance to the dog; it is the *petit chien* of the French Canadians and the *wishtonwish* of the western Indians. Burrowing owls and rattlesnakes occupy the burrows with the prairie dogs. In regard to the snakes, Mr. Kendall, in his narrative of the Santa Fé expedition, says that the prairie dogs are "compelled to let them pass in and out without molestation." A smaller species (*C. Columbianus*, Ord), with a shorter tail, is found on the plains near the Columbia river; it is reddish above, with the tail edged and tipped with white.

Prairie Dog (Cynomys Ludovicianus)

PRAIRIE DU CHIEN, a town and the capital of Crawford co., Wisconsin, on the Mississippi river, 2 m. above the mouth of the Wisconsin river, and on the Chicago, Milwaukee, and St. Paul railroad, 87 m. W. of Madison; pop. in 1870, 2,700. It is beautifully situated on a prairie 9 m. long and 1 m. wide, bordered on the east by high bluffs. It has steamboat communication with St. Paul and other points on the Mississippi, and contains three wagon factories, two plough factories, a chair factory, a planing mill, a saw mill, three cabinet shops, two machine shops, five boot and shoe shops, a flour mill, a brewery, a grain elevator, two large hotels, St. John's college and St. Mary's female institute under the control of the Roman Catholics, two weekly newspapers, and six churches. St. John's college was organized in 1865, and in 1873–'4 had 16 instructors, 120 preparatory and 95 collegiate students, and a library of 3,800 volumes.—The French are said to have formed a settlement here in 1755, but Capt. Carver, who visited the place in 1766, makes no mention of any white inhabitants. Americans began to settle here about 1835.

PRAIRIE HEN. See GROUSE, vol. viii., p. 271.

PRAIRIE SQUIRREL, the common name of the North American rodents of the genus *spermophilus* (Cuv.), most of them coming under Brandt's subgenus *otospermophilus;* they belong to the marmot family, and seem to connect these with the ground squirrels. The ears are moderate but generally distinct, the tail long and squirrel-like, and the cheek pouches well developed; the soles behind the toes are hairy in winter, naked in summer; the claw of the thumb is very small, or is replaced by a flat nail; the body more slender than in the marmot or woodchuck. These animals take the place of the tree squirrels in the west, and are fitted for terrestrial life on the grassy prairies, feeding on the roots and seeds of prairie plants; the body is rather thick-set, and the legs and toes are short, with straight nails for digging; they pass the winter in a torpid state in the cold regions, carefully stopping up the mouths of their holes; they are diurnal and gregarious, though to a less extent than the prairie dogs. The California prairie squirrel (*S. Beecheyi*, F. Cuv.) is about 11 in. long, with a tail about 8 in.; the general color above is an indistinct mottling of black, yellowish brown, and brown; below pale yellow; a broad hoary white patch on the sides of neck and shoulders, extending back a short distance on the sides; ears acute and prominent, black on the inside; tail flattened and well covered with hairs; body slender, and the head acute, with long whiskers; fur short, thin, and coarse. This species cause much damage to the farmer in the fields of grain and the vegetable garden, and by disturbing the soil in their excavations. The best known species is the striped prairie squirrel (*S. tredecim-lineatus*, Aud. and Bach.), 6 in. long, with a tail of 4 in.; the color is dark brown above, with nine stripes of this color alternating with eight of a yellowish gray (the lower ones not always distinct), the five central ones of the former with yellowish dots and spots; lower parts and tail brownish yellow, the latter margined and tipped with blackish. It is found abundantly on the western prairies, above lat. 40° N. In Iowa, Wisconsin, Minnesota, and northern Illinois it is commonly called gopher; for the true animal of this name (*geomys bursarius*, Rich.), see GOPHER. It is not found in heavy timber lands, but sometimes in oak openings, and generally on the prairies; its burrows are so shallow that a few pailfuls of water will commonly drown it out. The food consists of grasses, roots, seeds, insects, and field mice; though it is sometimes destructive in newly cultivated districts or in neglected fields, to an extent which may require a second planting, it probably more than makes up the loss by the destruction of mice and noxious insects; it disappears before the plough, and rarely attacks old and well cultivated fields. It brings forth six or seven young, once a year, in May or June.

Striped Prairie Squirrel (Spermophilus tredecim-lineatus).

PRAIRIE WOLF. See WOLF.

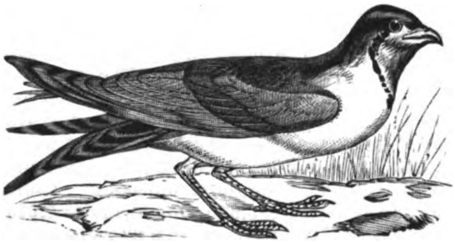
PRAKRIT. See INDIA, RACES AND LANGUAGES OF, vol. ix., p. 216.

PRAM, Christian Henriksen, a Danish poet, born in Norway, Sept. 4, 1756, died in St. Thomas, Nov. 5, 1821. He studied law and political economy in Copenhagen, was connected with the department of commerce, edited a commercial journal, originated the literary journal "Minerva," and was one of the founders and long president of the Scandinavian literary society. In 1819 he was appointed director of the custom house at St. Thomas. His principal work is the legendary epic *Stærkodder* (1785). A select edition of his miscellaneous writings was published by Rahbeck, with a biographical sketch (4 vols., Copenhagen, 1824–'6).

PRASLIN. I. César Gabriel, count de Choiseul, duke de, a French statesman, born in Paris, Aug. 14, 1712, died there, Nov. 15, 1785. In 1748 he retired from the army with the rank of general, after 17 years' service. He was ambassador in Vienna from 1758 to 1760, succeeded his cousin the duke de Choiseul as minister of foreign affairs in 1761, was made a duke and peer in 1762, and in 1763 signed the treaty which ended the seven years' war. In 1766 he became minister of marine and president of the royal council of finance. He enlarged and fortified the port of Brest, increased the navy, and promoted the expedition of Bougainville. In 1770 he retired from office with Choiseul. **II. Charles Laure Hugues Théobald,** duke de Choiseul-Praslin, a descendant of the preceding, born in Paris, June 29, 1805, died there, Aug. 24, 1847. He was a deputy from 1839 to 1842, and an equerry to the duchess of Orleans till 1845, when he was made a peer. In his 19th year he married the only daughter of Marshal Sebastiani, by whom he had several children. On Aug. 17, 1847, her body was found in her room hacked to pieces. He was arraigned before a tribunal of peers for assassinating her, and was sent to prison, where he poisoned himself.

PRATI, Giovanni, an Italian poet, born at Dascindo, near Trent, Jan. 27, 1815. He received his diploma as an advocate in Padua, but devoted himself to poetry. In 1862 he became a member of the Italian parliament. His *Canti lirici* and *Canti per il popolo* (3 vols., Milan, 1843) were very popular. Among his other works are *Memorie e lacrime* (1844), *Passeggiate solitarie* (2 vols., 1847), *Nuove poesie* (Turin, 1856), and *Ariberto* (1860). Complete editions of his writings appeared at Florence in 1852, and at Milan in 1862.

PRATINCOLE (*glareola*, Briss.), a genus of wading birds of the plover family, inhabiting the temperate and warmer regions of the old world. About half a dozen species are described in Europe, Asia, Africa, and Australia, frequenting the borders of rivers, lakes, and marshes, in low and in high regions; the food consists of worms and insects, which they pick from the ground or aquatic plants, or take on the wing like swallows; they fly and run very swiftly; the nest is a slight structure on the ground, among the thick herbage of the marshes, and the eggs three or four in number. The collared pratincole (*G. pratincola*, Pall.) is about the size of a blackbird, 9 in. long; it is brown above, white on the rump and below; the throat surrounded by a black circle; the base of the bill and the feet reddish. It is plentiful in Austria, and has received one of its specific names (*Austriaca*) from that country; it is occasionally found in England, and is extensively distributed over the old world; it is usually seen in flocks which are very noisy; the food consists chiefly of beetles and grasshoppers. It so resembles the swallows in its forked tail and flight, that it was at first placed among them by Linnæus; from its appearance and habits on the ground it is called sea partridge by the French.



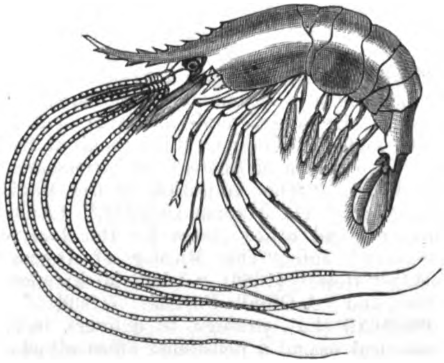
Collared Pratincole (Glareola pratincola).

PRATO, a town of Italy, in the province and 10 m. N. W. of the city of Florence, on the Bisenzio, an affluent of the Arno; pop. about 12,000. It has many squares and churches. The cathedral was enlarged in the 18th century by Giovanni Pisano. It has a campanile, a richly ornamented chapel, and a celebrated pulpit by Donatello. The collegio Cicognini formerly belonged to the Jesuits. The palazzo Pretorio, formerly del Popolo, is now a prison. Prato is famous for its bakeries and its red Turkish caps; and straw plait, silk thread, and coarse woollen cloth are manufactured. It was at one time an independent republic, but was subjected by the Florentines in 1358.

PRATT. **I.** A S. county of Kansas, watered by affluents of the Arkansas river; area, 900 sq. m. It is not included in the census of 1870. Capital, Prattsville. **II.** A S. W. county of Dakota, recently formed and not included in the census of 1870; area, about 3,000 sq. m. It is intersected by White river, an affluent of the Missouri. It has a rolling surface, consisting mainly of prairies well adapted to grazing.

PRATT, Charles. See CAMDEN, EARL.

PRAWN, a marine decapod crustacean, of the macrourous division and genus *palæmon* (Fabr.). About 20 species are described, mostly small, though some from tropical regions are a foot long; they somewhat resemble the crawfishes in appearance, habits, and movements. The carapace is broad, prolonged anteriorly into an acute, laterally flattened rostrum, with eight or nine teeth above and three or four below, usually extending beyond the peduncles of the antennæ; the eyes large and prominent; the first and second pairs of feet terminate in two-fingered claws, the second pair the largest and longest; carpus inarticulate; external jaw-feet short and slender; external antennæ very long, with a scale at the base, and sometimes with three threads; five pairs of fin-like fringed feet under the tail, the principal swimming organs in forward locomotion; tail ending in movable leaflets as in the lobster, by which the animal darts rapidly backward when alarmed. The best known, most common, and most esteemed as food is the serrated prawn (*P. serratus*, Leach), found on the coasts of England and France, in rocky situations, and in still, clear water, living among the floating seaweeds; it is about 4 in. long, of a bright gray, spotted and lined with darker purplish gray; it turns red by boiling. It is taken in traps resembling lobster pots, but smaller and with closer meshes, and in bag nets. The flesh is tender, sweet, nutritious, and easily digested; it is generally cooked in vinegar and salt; on account of the thinness of the shell the whole animal is eaten; large numbers are consumed, and the London market is supplied principally from the isle of Wight and the Hampshire coast; the females in spring, when with eggs, are most highly esteemed; they are also used as bait; they must be cooked very soon, as the flesh decomposes quickly, and with an almost insupportable odor. Very many are devoured by fishes, but their numbers are kept undiminished by their remarkable fecundity. They are rapid swimmers when alarmed. There are other species in the Mediterranean, the largest of which are salted, and are consumed by the Greeks and Armenians during Lent. The American prawn (*P. vulgaris*, Say) is much like the *P. squilla* (Fabr.) of Europe; it is a little larger than the shrimp, about 1½ in. long, and may be known by the large, upturned, toothed rostrum; the fingers of the second pair of feet are shorter than the hand.



Serrated Prawn (Palæmon serratus).

PRAXITELES, a Greek sculptor, flourished about the middle of the 4th century B. C. He ranks at the head of the later Attic school, but nothing is known of his personal history, except that he was a resident of Athens. He was unsurpassed in the exhibition of the softer beauties of the human form. In the Cnidian Venus, his most celebrated work, of Parian marble, the position of the left hand was the same as in the Venus de' Medici; the right hand held some drapery which fell over a vase beside the statue, and was intended to indicate that she had just left the bath. Pliny recounts that Praxiteles made two statues of Venus, the one draped, the other naked, and that he thought them of equal value, and offered them for the same price; that the people of Cos bought the draped one, the people of Cnidus the other; and that this latter totally eclipsed the fame of the draped statue. It was afterward taken to Constantinople, where it perished by fire in the reign of Justinian. Praxiteles also made two marble statues of Eros. It is said that in his fondness for Phryne, the courtesan, the artist had promised to give her whichever of his works she chose, but would not tell her which of them he thought the best. To discover this she sent a slave to tell him that a fire had broken out in his house, and that his works would perish, whereupon he cried out that all his toil was lost if the fire had touched his satyr or his Eros. Phryne chose the Eros, and dedicated it at Thespiæ. The satyr is said to have stood in the street of the tripods at Athens, and it is supposed that several existing marble statues, which represent a satyr leaning against the trunk of a tree, are copies of it. His works in marble are thought to have been covered with a thin encaustic varnish of flesh color.

PRÉAULT, Antoine Augustin, a French sculptor of the romantic school, born in Paris, Oct. 8, 1809. He was a pupil of David, and his works include "Undine," "The Amazon River," "The Queen of Sheba," "Charlemagne," "Carthage," "The Adoration of the Magi," "Ophelia," "The Human Comedy," "André Chenier" and other pieces for the Louvre, "Hecuba" and "The Murder of Ibycus" (1863), "Hope" (1866), "Adam Mickiewicz" (1868), and "A Child's Portrait" (1869).

PREBEND (Lat. *præbere*, to deliver), in ecclesiastical usage, a pensioned office attached to a cathedral or collegiate church, and the emoluments derived from the same. Canons or members of cathedral or conventual chapters were to receive for the singing of the divine office, or the fulfilment of some equivalent duty, a fixed stipend distributed weekly or daily, which was called *portio canonica præbenda*. It became also the custom to endow more richly certain offices in the chapter to which the cure of souls and jurisdiction were attached. These prebends were styled dignities, and the prebendaries holding them were called dignitaries. In the middle ages all members of a chapter were titular canons, and all titular canons were prebendaries. After the reformation, in the church of England, prebends attached to the cure of souls were given to priests who were not canons. At present all members of English chapters are styled canons and are provided with prebends. Honorary canons, free from the obligations of residence and office, are not prebendaries.

PREBLE, a S. W. county of Ohio, bordering on Indiana, and drained by Franklin, Four Mile, and St. Clair creeks, tributaries of the Great Miami; area, 422 sq. m.; pop. in 1870, 21,809. The surface is nearly level and the soil very fertile. It is intersected by several railroads connecting with Cincinnati, Dayton, and other points. The chief productions in 1870 were 700,475 bushels of wheat, 973,686 of Indian corn, 298,315 of oats, 32,497 of barley, 60,664 of potatoes, 24,486 of flax seed, 7,978 tons of hay, 23,900 lbs. of flax, 36,119 of wool, 507,313 of butter, 22,299 of maple sugar, and 36,039 gallons of sorghum molasses. There were 7,297 horses, 6,309 milch cows, 7,914 other cattle, 10,199 sheep, and 28,839 swine; 10 flour, 20 lumber, and 2 woollen mills. Capital, Eaton.

PREBLE, Edward, an American naval officer, born at Falmouth Neck, the site of the present city of Portland, Me., Aug. 15, 1761, died in Portland, Aug. 25, 1807. He sailed in a privateer in 1777, and in 1779 entered the provincial marine of Massachusetts as a midshipman. He was in the action between the Protector and the English privateer General Duff, and was afterward captured and confined on board the prison ship Jersey in the harbor of New York. On being liberated, he joined the Massachusetts vessel of war Winthrop, on which he remained till 1782, distinguishing himself by boarding with 14 men an English armed brig lying off Castine, and carrying her out under the fire of an English battery. After the return of peace he was 15 years in the merchant service. In 1799 he was commissioned a lieutenant in the navy, and took command of the Pickering, one of the squadron stationed at the Windward islands. In June of the same year he was made captain, and appointed to command the Essex, in which he convoyed home from Batavia a fleet of 14 merchant vessels. In 1803 he received command of the squadron sent against Tripoli, his flag ship being the Constitution. Anchoring at Tangiers with a part of his squadron in October, he opened negotiations by which he averted a war with Morocco. On Nov. 12 he declared the blockade of Tripoli. The Philadelphia, 38 guns, under Capt. Bainbridge, had been run upon the rocks and captured by the Tripolitans, but was destroyed at her anchorage in the harbor by Lieut. Decatur (see Decatur, Stephen), Feb. 16, 1804. On July 25 Preble was before Tripoli with 15 sail, including 8 small vessels borrowed of the Neapolitan government. His first attack was made, Aug. 3, upon the enemy's gunboats, protected by batteries on shore. He captured three of the largest by boarding, and sunk three others, and withdrew after a fight of three hours. On the 7th another attack was made, but with less success, as the Tripolitans kept close within the harbor. One of Preble's gunboats was sunk. Another general attack was made on the 28th, when 13 Tripolitan gunboats and galleys were closely engaged with the 8 American boats. One of the Tripolitan boats was sunk and two were driven ashore; the rest retreated. The Constitution lay three quarters of an hour within musket shot of the mole, pouring a destructive fire upon the town batteries. On Sept. 3 a fourth attack was made. The Tripolitans had in the mean time raised and added to their flotilla their boats which had been sunk on Aug. 3 and 28. Com. Preble brought to in the Constitution, in a position where 70 heavy guns bore upon his ship. After throwing more than 300 round shot and receiving great damage she hauled off, Preble having before directed the other vessels to do so. The Intrepid, a ketch captured from the enemy, which Lieut. Decatur had used in destroying the Philadelphia, was converted into a fire ship, carrying 100 barrels of gunpowder in bulk, and on the deck immediately above 150 shells, with a large quantity of shot; and on the night of Sept. 4, under command of Capt. Somers and Lieut. Wadsworth, both volunteers, with a volunteer crew, she was taken into the harbor to be exploded by a train. The batteries opening upon her, she exploded prematurely, and none of the adventurers escaped. One of the Tripolitan gunboats was missing, but on the whole a serious loss was sustained by the Americans without any commensurate damage to the enemy. On Sept. 10 Com. Samuel Barron arrived off Tripoli in the President, and relieved Com. Preble, who soon after sailed in the John Adams for the United States, where he arrived Feb. 26, 1805. He received a gold medal and a vote of thanks from congress.—His nephew, Capt. GEORGE HENRY PREBLE, U. S. N., born in Portland, Me., Feb. 25, 1816, served with distinction in Mexican and Chinese waters and during the civil war, and has published "Genealogy of the Preble Family" (8vo, 1868) and "History of the American Flag" (Albany, 1872).

PRECESSION OF THE EQUINOXES, a slow regression of the equinoctial points upon the plane of the ecliptic. It is so called from its causing the sun to arrive in either equinox a little earlier than he otherwise would. The effect is to increase the longitudes of the fixed stars at the rate of about 50¼″ annually. The discovery of the movement is due to Hipparchus, about 150 B. C. Copernicus was the first to give a true explanation of the phenomenon. Newton discovered its physical cause. This cause is the attraction of the sun, moon, and planets upon the spheroidal figure of the earth, giving to the axis a gyratory or conical motion well represented by the waving or nodding of a top in spinning. The pole of the equator is thus made to shift its place, performing a complete revolution around the pole of the ecliptic in 25,868 years. Ptolemy's assumption of the value of precession led him to assign incorrect positions to stars which he catalogued as if observed by him. Delambre compared the positions of 312 stars catalogued by Ptolemy with the positions observed by Flamsteed, and found that the deduced precession amounted to 52·4″. But by treating Ptolemy's longitudes as simply deduced from Hipparchus's by adding 2° 40′ for the interval of 267 years between Hipparchus and Ptolemy, Delambre deduced 50·12″, which is very nearly correct. Ptolemy ought to have added 3° 37′ instead of 2° 40′. But the most serious error was his publishing as his own a catalogue derived from that of his illustrious predecessor, instead of indicating the manner in which the catalogue was obtained. The result is the same as though he had handed down Hipparchus's catalogue, otherwise unknown; but grave doubts have been thrown on all Ptolemy's observations since his detection, 1,700 years after the deed, in this serious offence. The Arabian astronomers reached a result much truer than that assumed by Ptolemy.

PREGNANCY. See MEDICAL JURISPRUDENCE, and OBSTETRICS.

PREHISTORIC REMAINS. See AMERICAN ANTIQUITIES, ARCHÆOLOGY, BONE CAVES, FINDS, and LAKE DWELLINGS.

PRELLER, Friedrich, a German painter, born in Eisenach, April 25, 1804. He studied in Weimar, Dresden, Antwerp, and Italy, and became professor at Weimar in 1831. His principal works are his frescoes and cartoons illustrative of the Odyssey at Leipsic and Weimar, each including 40 designs, which were published at Leipsic in 1872 with the translation of Voss. His other productions include "Calypso," "Leucothea," "Nausicaa," historical landscapes, and marine pieces.

PREMONSTRATENSIANS (Fr. *pré montré*, meadow pointed out), or **Norbertines,** a religious order in the Roman Catholic church, founded in the diocese of Laon, France, in 1120, by St. Norbert, a canon regular from Xanten, Germany, who became archbishop of Magdeburg in 1126, died in 1134, and was canonized in 1582. On a meadow in the forest of Coucy, pointed out to him as he believed from heaven, Norbert gathered his first disciples, and gave them the strict rule of St. Augustine. They were at first a congregation of regular canons, and as such were confirmed in 1126 by Pope Honorius II.; but gradually they assumed all the distinctive peculiarities of a monastic community. The order spread very rapidly, and became very popular in France by aiding in the suppression of the Albigenses; and in Germany it accumulated immense riches, and several of the abbots were raised to the rank of princes of the empire. The abbot of the parent convent of Prémontré, near Coucy, had the title of general, and he formed with three other French abbots the supreme council of the order. A female branch of the order was established simultaneously with that of monks, and, as in several other orders founded at that time, the female convents were at first contiguous to those of the monks, and only separated from them by a wall. At the time of the reformation the order had about 2,000 convents, of which about 500 were for women. The strictness of the primitive rule having been abandoned, reformed congregations "of the strict observance" were established in Spain (1573) and in France, which however remained in connection with the other convents, and the union was strengthened by new statutes in 1630. In the 18th century the number of convents greatly decreased, and the female branch became almost entirely extinct. The Premonstratensians are at present (1875) suppressed in Italy, Spain, the German empire, and Switzerland.

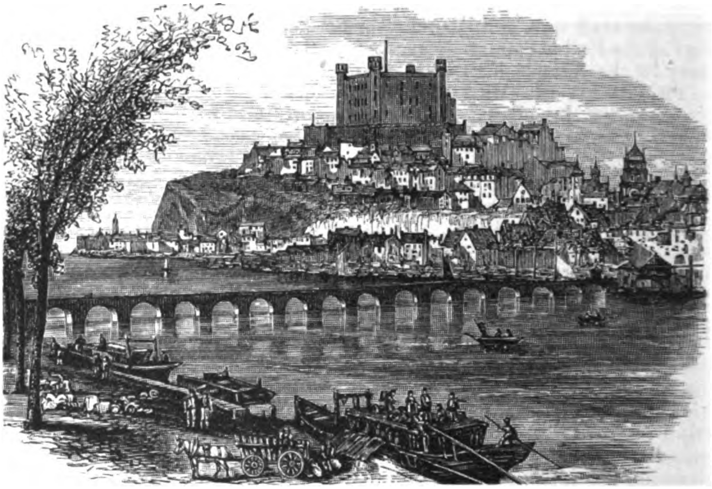
PRENTICE, George Denison, an American editor, born in Preston, Conn., Dec. 18, 1802, died in Louisville, Ky., Jan. 22, 1870. He was principal of a public school before he was 15 years old, and graduated at Brown university in 1823. He studied law, was for two years editor of the "New England Weekly Review" at Hartford, and then removed to Louisville, Ky., where in 1831 he became editor of the "Louisville Journal," for many years a leading advocate in the west of the policy of the whig party. During the civil war it maintained the cause of the Union. In 1831 he published a life of Henry Clay. His short newspaper paragraphs were widely copied for their wit, and a selection from them has been published under the title of "Prenticeana" (New York, 1860; new ed., with a biographical sketch by G. W. Griffin, Philadelphia, 1870). See also a memorial address by his successor, H. Watterson (Cincinnati, 1870).

PRENTISS, a N. E. county of Mississippi, drained by the head waters of the Tombigbee river; area, about 400 sq. m. It has been formed since the census of 1870. The surface is diversified, and the soil generally fertile. It is traversed by the Mobile and Ohio railroad. Capital, Booneville.

PRENTISS, Seargent Smith, an American orator, born in Portland, Me., Sept. 30, 1808, died near Natchez, Miss., July 1, 1850. He graduated at Bowdoin college in 1826, and commenced the study of law, but in 1827 went to Natchez, where he supported himself as tutor in a private family. He was admitted to the bar in 1829, and in 1832 removed to Vicksburg, where he was elected in 1835 to the state legislature, and in 1838 to congress. He took little part in the business or debates of the house, but maintained his reputation as an orator by a speech against the sub-treasury bill. He strongly opposed the repudiation of the state debt of Mississippi, and in 1845, partly in dissatisfaction with the course adopted, he removed to New Orleans, where he passed the remainder of his life, going to Natchez in his last illness. A "Memoir of S. S. Prentiss" has been edited by his brother, George L. Prentiss, D. D. (2 vols., New York, 1855).

PRENZLAU, or **Prenzlow**, a town of Prussia, in the province of Brandenburg, on the Ucker, 60 m. N. N. E. of Berlin; pop. in 1871, 14,442, including many descendants of French Huguenots. The Gothic St. Mary's church, of the 14th century, has two towers and a celebrated organ. The mineral spring in the Neustadt is known as the Elisabethbad. Linens and woollens are manufactured, and tobacco is largely produced; the chief trade is in grain and cattle. The Prussians under Hohenlohe surrendered here to the French under Murat, Oct. 28, 1806.

PRESBURG (Hung. *Pozsony*). **I.** A N. W. county of Hungary, bordering on the counties of Neutra, Komorn, and Wieselburg, and on Lower Austria; area, 1,664 sq. m.; pop. in 1870, 297,377, chiefly Slovaks and Magyars. It is traversed by the Carpathians and watered by the Danube, which near the city of Presburg divides into two arms, forming the island of Schütt. With the exception of the numerous marshes, the soil is very fertile. The chief products are wheat, hemp, fruit, chestnuts, cattle, horses, and marble. The principal town, next to the capital, is Tyrnau. **II.** A city, capital of the county, on the left bank of the Danube, and on the Pesth and Vienna railway, 35 m. E. of Vienna, and 100 m. W. N. W. of Pesth; pop. in 1870, 46,540. It stands on elevated ground, and is semicircular, with the river on the S. side. The Danube is here about half a mile wide, and is crossed by a bridge of boats. Among the principal buildings are the cathedral, where the kings of Hungary were for-



Presburg.

merly crowned, the palace of the archbishop of Gran, the city hall, and a German theatre. The city has a law school, a Roman Catholic seminary, a Protestant lyceum, and a number of other institutions. Among the historical curiosities are the old castle, once a royal residence, ruined by a fire in 1811, and the "coronation hill," an artificial mound, which the newly crowned kings ascended, brandishing the sword of St. Stephen. Cotton, woollen, and silk goods, leather, oil, and tobacco are manufactured.—Presburg became the capital of Hungary after Buda was taken by the Turks in 1529, and remained so till Joseph II. again made Buda the administrative capital in 1784. It continued, however, to be the legislative capital down to 1848, when the seat of the diet was transferred to Pesth. Presburg was captured in 1619 by Bethlen Gábor, prince of Transylvania, but was recaptured by the imperial troops in 1621. After the battle of Austerlitz, the treaty between France and Austria was concluded at Presburg (Dec. 26, 1805). The city was taken by the French in 1809.

PRESBYTERIANISM (Gr. πρεσβύτερος, elder), a system of church government by presbyters. These consist of two classes, teaching and ruling elders, the former answering to pastors or ministers, and the latter being the elected representatives of the congregation, and uniting with the pastor in the exercise of discipline. The pastor of a church and its ruling elders constitute the session of the local church, and manage its internal affairs. From its decision an appeal may be taken to the presbytery, which is composed of the pastor and an elder from each of the congregations within its bounds. In this country ministers without charge may also be members of the presbytery. The synod, to which appeal may be made from presbytery, is composed of several adjoining presbyteries. The general assembly, composed of representatives from all the presbyteries, may entertain appeals from synods in certain cases, but it can make no constitutional changes till the matter in question has been submitted to the presbyteries and has met their approval. In the established church of Scotland, a "commission" appointed by the assembly exercises to some extent executive and judicial functions. Notwithstanding the diversity in the names and methods of these judicatures, a church may be strictly presbyterian without being dependent on the higher judicatories. Presbyterians believe in the parity of the ministry, and that each congregation has the right to elect its own officers. Elders are generally elected for life, although the French Reformed church elected them for a specified term, and this practice has of late been quite extensively revived in the United States. By the action of the northern general assembly in May, 1875, based upon the favorable response of a majority of the presbyteries to an overture sent down to them in 1874, all the churches under its care are now at liberty to adopt in the election of elders the principle of term service.—Presbyterians believe that the representative system of church government, in opposition to that which is conducted by the entire ecclesiastical population, has its germ in the Old Testament; inasmuch as the people of Israel, at various periods of their history, had "wise and able men" set over them, who were styled elders; and especially as this is well known to have been a distinctive feature of the synagogue system up to the time of the advent of Christ. And as each particular synagogue was governed by a bench of elders, of which the bishop or "angel of the church" was the presiding officer, so the whole Jewish body was reckoned as one. In cases of alleged erroneous judgment, there were always appeals admitted to the "great synagogue" at Jerusalem, where there was an opportunity of having wrong decisions reversed. The first converts to Christianity being all native Jews, who had been accustomed to the exercise of government by benches of elders, it was natural that they should adopt the representative plan in organizing the primitive church. Accordingly, we read in the New Testament of "elders being ordained in every church;" of an important question being referred to a synod made up of "apostles and elders;" of "elders who ruled well, but did not labor in the word and doctrine;" of the "elders of the church being called for to visit and pray over the sick," &c. So also Presbyterians hold that preaching the gospel, "feeding the sheep and the lambs" of Christ, and administering the Christian sacraments, are the highest offices intrusted to Christian ministers; that a plurality of elders was, by divine direction, ordained in every church; that in no instance in the New Testament do we find an organized congregation under the watch and care of a single officer; that bishop and elder are titles given interchangeably to the same persons, showing that the title of bishop in the apostolic age designated the pastor or overseer of a single flock or church. They hold that there is but one commission given to the authorized ministers of the word and sacraments; that the ordaining power is manifestly represented as possessed and exercised by ordinary pastors, and that ordination is performed by "the laying on of the hands of the presbytery;" that there is not a solitary instance recorded in the New Testament of an ordination being performed by a single individual; that even when deacons were set apart to their office, it is evident from the narrative (Acts vi. 1-6) that a plurality laid hands upon them with fasting and prayer. They moreover believe that the whole visible church was regarded as one body, subject to the same authority, and regulated by the same judicial decisions; in illustration of which they refer to the fact that when a question arose which was of common interest to the whole Christian community, it was decided by a synod of the "apostles and elders at Jerusalem," and the decrees of that synod were sent down to "all the churches" to be registered and obeyed. Presbyterians assert that the system of ecclesiastical government disclosed by the epistles of Ignatius and Clemens Romanus is thoroughly presbyterian; that this system prevailed for more than 100 years after the apostolic age; that the first inroads upon it were by the pastors of the large towns claiming special preëminence and power as peculiarly the successors of the apostles, and that this claim came gradually to be admitted, and was at last permanently established. They maintain, however, that the admission of this claim was never by any means universal; that the Paulicians in the 7th century, and after them the Waldenses and Albigenses, earnestly protested against all encroachments on presbyterian simplicity; and that when the reformation came, there was a vast preponderance of opinion among the leaders in that movement in favor of the presbyterian system; and the reformed churches in France, Germany, Holland (see **Reformed (Dutch) Church**), Hungary, Geneva, and Scotland were substantially presbyterian, modelled after the plan laid down by Calvin in his "Institutes," which he only partially succeeded in establishing at Geneva, when the "council" had succeeded to some of the prerogatives of the exiled bishops. (See **Calvin**.) The different bodies into which the Presbyterian church is divided are as follows. I. **Presbyterian Church in Scotland.** The first general and public movement leading to the organization of the Presbyterian church of Scotland was the drawing up of a common bond or covenant, known as "The First Covenant," and subscribed at Edinburgh, Dec. 3, 1557, by several of the most powerful of the Scotch nobility and a large number of lesser barons and influential country gentlemen, known subsequently (on account of their frequent use of the word congregation to designate those for whom they professed to act) as lords of the congregation. The signing of the covenant was followed by a proclamation from the queen regent forbidding any one to preach or administer the sacrament without the authority of the bishop. The result was a collision of the royal power with popular feeling, and when the latter was at its height, in connection with the trial of offenders which the queen had falsely promised to defer, the lords of the congregation summoned John Knox from Geneva. He landed at Leith, May 2, 1559. The council, then engaged in the trial, was panic-struck, and dispersed. Four weeks later the "Second Covenant" was subscribed, and on Dec. 20, 1560, the first general assembly of the church of Scotland met in Edinburgh. The "First Book of Discipline" was soon after drawn up, but the task of perfecting the organization of the church, which Knox had begun, devolved upon Andrew Melville, who arrived from Geneva in 1574. In 1578 the "Second Book of Discipline," thenceforth the authorized standard of the church of Scotland, was adopted. It was ratified by the parliament, but incessantly opposed by James I., who in 1621 so far succeeded in his attempt to introduce a modified episcopacy as to secure the adoption of what are known as the five Perth articles. In prosecuting the policy of securing a more perfect ecclesiastical conformity of Scotland to England, Charles I. was met by such a tide of popular and enthusiastic opposition as defeated his projects and led England and Scotland to unite in the "Solemn League and Covenant" (1643), and in the convocation at the same time of the Westminster assembly of divines, by whom the confession and catechisms since recognized as the standards of the Presbyterian church were drawn up. On the restoration of Charles II. Episcopacy was reëstablished in Scotland; but the Presbyterians still resolutely adhered to their principles, and on the deposition of James II. they confidently anticipated the triumph of their cause. Though William III. was bent on preserving the same form of ecclesiastical government in England and Scotland, the bishops refused to transfer their allegiance to him, and by this means the way was opened for that establishment of presbytery which had been urged upon him by some of his most zealous adherents, and which was ratified by an act of parliament in 1690. Thus, Scotland and England having been separate kingdoms at the time of the reformation, a difference of circumstances in the two countries ultimately led to different religious establishments; and when the treaty of union was formed in 1707, it was agreed by both kingdoms that Episcopacy should continue in England, and Presbyterianism should be the only religious system recognized by the state in Scotland. The only confession of faith legally established before the revolution of 1688 is that which is published in the "History of the Reformation in Scotland," attributed to John Knox. It consists of 25 articles, and was the confession as well of the Episcopal as of the Presbyterian church. The Covenanters, indeed, during the commonwealth, adopted the Westminster confession. At the revolution this confession was received as the standard of the national faith; and it was ordained by the same acts of parliament which settled Presbyterian church government in Scotland, "that no person be admitted or continued hereafter to be a minister or preacher within this church unless he subscribe the [that is, this] confession of faith, declaring the same to be the confession of his faith." By the act of union in 1707, the same is required of all professors, principals, regents, masters, and others bearing office. The Westminster confession of faith then, and what are called the larger and shorter catechisms, contain the publicly recognized doctrines of this church; and it is well known that these formularies are an embodiment of the Calvinistic faith. No liturgy or public form of prayer is used in the church of Scotland, the minister's only guide being the "Directory for the Public Worship of God." The administration of the Lord's supper, as a general thing observed four times a year, is conducted with simple forms, but is accompanied, and sometimes preceded and followed, by extra religious services, consisting of prayers and exhortations. The metrical version of the Psalms by Francis Rous (died 1659) is used, and supplementary hymns have recently been introduced. The provision which has been made by the law of Scotland for the support of the clergy of the established church consists of a stipend, a small glebe of land, and a manse (parsonage house) and office houses. By an act of parliament passed in 1810, £10,000 per annum was granted for augmenting the smaller parish stipends in Scotland. By this act the lowest stipend assigned to a minister of the establishment is £150 sterling, with a small sum, generally £8 6*s.* 8*d.*, for communion elements. Patronage was abolished in Scotland in 1649; was revived at the restoration; was partly abrogated at the revolution, and again revived in 1712. From the first it was strenuously resisted by a portion of the church, on the ground that it invaded the headship of Christ, robbed the people of their rights, and made them dependent upon the presentation of the patron. It has frequently resulted in scenes of violence, and to it the repeated secessions from the church have been due. The first who formally withdrew were the Covenanters or Cameronians, who objected to the interference of the state authorities in church affairs, and to the Erastian principles involved in any establishment of religion, as inconsistent with the covenant to which the church had sworn. (See CAMERONIANS.) The first secession after the church was established originated in a discourse by Ebenezer Erskine before the synod of Perth in 1732. His severe remarks on patronage drew upon him the censure of the synod, and in 1738 he was excluded by the general assembly from the ministry of the church. Three other ministers who sustained him shared his fate, and united with him to form the Associate presbytery. Assured of much popular sympathy, this body rapidly increased. In 1747 its members were divided in sentiment as to the lawfulness of taking what was called the burgher oath, and the result was the separation of the body into the Burgher and Anti-Burgher synods. Each continued to increase, and each had its adhering organization in America, but a reunion was effected in 1820. The next secession took place in connection with the deposition of the Rev. Thomas Gillespie by the general assembly of 1752, for refusing to assist in the installation of a minister presented by a patron against the will of the congregation. This secession is known as the Relief. Receiving accessions and sympathy from English dissenters, it manifested a more liberal spirit than the previous secession. Strengthened by popular sympathy, it continued to prosper, and, after rejoicing in the reunion of the two branches of the Associate church in 1820, was prepared in 1847 to unite itself with them to constitute the body known as the United Presbyterian church of Scotland. This body now has nearly half as many ministers as the established church. The next secession, that of the Free church of Scotland in 1843, was more extensive and memorable than any that preceded it. For more than half a century the established church had been divided into two parties: the moderates, who are ridiculed in Dr. Witherspoon's "Characteristics," and were decidedly in the ascendant, and the evangelicals, who were more in sympathy with missions and denominational coöperation, and strongly opposed to patronage. Resistance to patronage when enforced by the civil courts brought matters to a crisis, and under the lead of Drs. Welsh and Chalmers more than 400 ministers withdrew in a body from the establishment, leaving manse, glebe, and church edifice behind them, and throwing themselves upon the voluntary support of their people. The pastors were sustained, new church edifices were built, and in less than a generation the Free church has doubled in numbers and strength. (See FREE CHURCH OF SCOTLAND.) Recovering from the depression occasioned by the last secession, the established church has continued steadily though slowly to increase, until recently, by the action of the British parliament, it has secured a final release from the incubus of patronage that had so long rested upon it. The three principal Presbyterian bodies in Scotland have a relative strength, when judged by the number of their ministers, to which the churches nearly correspond, as follows: the established church about 1,300, the Free church 900, and the United Presbyterians 600; to which may be added the Reformed Presbyterians, dating from the period of persecution, 40 ministers, and the Original Seceders, 25 ministers. II. PRESBYTERIAN CHURCH IN IRELAND. Presbyterians settled in Ireland shortly after the reformation, and were at first admitted to the privileges and emoluments of the Episcopal church. They were not tenacious about matters of church polity, for some of the pastors received ordination at the hands of a bishop, and the people conformed without scruple to some of the ceremonies of the established church. In the reign of Charles I., and during the administration of Laud, the interests of the Irish Presbyterians greatly suffered; the statutes of the college at Dublin, authorizing the admission of Presbyterians to its privileges and honors, were remodelled; their confession recognized in 1615 was set aside; and their ministers were ejected from their charges for nonconformity. During the protectorate of Cromwell they were again raised to the status of ministers of the national establishment. At the restoration, when Charles II. attempted to introduce episcopacy into Scotland, many of the inhabitants took refuge in Ireland; and thereby the cause of Presbyterianism received a fresh impulse. This was not diminished by the accession of William of Orange to the British crown; for he had been educated in Holland to a decided preference for the doctrines and discipline of that church. Nor did subsequent events tend to lessen his respect for the adherents of that system in Ireland; for when James II. landed there, with a view, through the invasion of this kingdom, of overturning the government, the Presbyterians rallied around the standard of their Protestant champion, and by their memorable defence of Londonderry, as well as the assistance they rendered at the battle of the Boyne, mainly contributed toward the success of his arms. As a testimony of his gratitude he doubled the sum originally given for the support of their ministers, hence known as the *regium donum*. On grounds of justice as well as favor, this was repeatedly augmented by the crown, until it amounted to about an average of £70 to each clergyman. With the disestablishment of the Episcopal church of Ireland, under Gladstone's recent ministry, the *regium donum* was discontinued, and the Presbyterian church of Ireland is entirely relieved from state dependence. In 1854 the Presbyterian church there was composed of the following bodies: the general synod of Ulster, the Presbyterian synod of Munster, the presbytery of Antrim, and the Seceders and Covenanters. The first two and most prominent of these have since united, forming a body which embraces 5 synods, 36 presbyteries, 491 congregations, and 598 ministers, and raises annually for missions and missionary schools about £9,000, besides sustaining various other evangelical enterprises. Though recognizing the principle of a civil establishment of religion, its views of the subject are more in harmony with those of the Free church than of the established church of Scotland. III. PRESBYTERIAN CHURCH IN THE UNITED STATES. The Presbyterian church of the United States was originally composed of various elements. Francis Makemie, who may be called its founder, was an Irishman, who, several years before the close of the 17th century, had gathered churches in Maryland, where toleration was enjoyed, and extended his labors also into Virginia, as far as the laws of that colony would permit. For several years before the organization of the first presbytery, his most intimate ministerial friend was Jedidiah Andrews, settled in 1698 over a church in Philadelphia. Ministers were sought for new congregations, with equal earnestness, from New England and abroad, Makemie himself visiting Boston to confer with Cotton Mather on the subject, and secure those whom an unfriendly writer of the time styles "Cotton Mather's emissaries," and crossing the ocean to bring back with him Hampton and Macnish, while also appealing for men and aid to Scottish and Irish Presbyterians and London dissenters. The churches at Jamaica, L. I., Newark, Freehold, and Woodbridge, N. J., and others which like them subsequently became Presbyterian, were largely of New England origin, and in the records of the times are spoken of somewhat indiscriminately as Scotch Independents or Presbyterians. By their locality they were separated from Congregational association, while in Connecticut a semi-Presbyterianism had been introduced (1709) by the Saybrook platform, and in Massachusetts the old usage of ruling elders had died out within the memory of men then living. But from abroad came Scotch and Irish Presbyterians, Welsh Calvinists, English dissenters, Reformed Dutch, and French Huguenots, blending diversely in different localities, but leaving the New England and Scotch-Irish elements predominant, and nearly of equal strength. By 1716 the Presbyterian body had so far increased as to warrant its division to form a synod. Harmony prevailed till about 1727, when, by ministers from Ireland, where the controversy against Arianism had excited a jealousy of loose subscription to the standards, the question was thrust upon the attention of the American synod, while the New England element was unanimous against the introduction of any new rule. A compromise, known as the adopting act, was effected in 1729, although it resulted in one or two secessions, which prepared the way for the establishment in this country of a branch of the Associate Presbyterian church. In 1739 party feelings were revived by the visit of Whitefield, and the synod was divided into those who were known as friends or enemies of the revival. The Tennents, active in the revival, sympathized with Whitefield, and, with the graduates of their "log college," furnished to the presbyteries candidates whom their opponents regarded as more zealous than learned or discreet. Thus the "New Side," as the Tennent party were called, insisted most on piety, while the "Old Side" demanded candidates with diplomas. In 1741, through a rash and violent protest of the New Side, the synod came to an open rupture. The New York presbytery, absent at the time, united four years later with the New Side to constitute the synod of New York, while the Old Side retained the former organization as the synod of Philadelphia. The New Side, to which the celebrated Samuel Davies of Virginia belonged, indisposed longer to patronize Yale college, from which David Brainerd had been recently expelled, sent Davies and Gilbert Tennent across the ocean to solicit funds for endowing Princeton college. That institution went into successful operation, and with ministerial accessions from New England, the New Side no longer suffered from lack of candidates. Supplying vacant churches and engaging in mission work, they soon outstripped the Old Side in numbers as well as enterprise; and in 1758, when the two bodies reunited to form the synod of New York and Philadelphia, the New Side outnumbered the Old Side, in ministers and churches, in the proportion of about three to one. The united body steadily increased, sending some of its strongest men on missions to Virginia and the Carolinas. But its progress was arrested by the revolutionary war, during which the synod sometimes found it difficult or impracticable to meet, and the churches, often deprived of the labors of their pastors, who were fugitives or in the camp as chaplains, suffered a decline. In the course of a few years after the war new presbyteries were organized in western Pennsylvania, Virginia, and the Carolinas, and new churches were gathered west of the Alleghanies. In 1785 steps were taken for revising the standards of the church and organizing a general assembly. A committee, consisting of Drs. Witherspoon, Rodgers, Robert Smith, Patrick Allison, Samuel Stanhope Smith, John Woodhull, Robert Cooper, James Latta, George Duffield, and Matthew Wilson, was appointed to "take into consideration the constitution of the church of Scotland and other Protestant churches," and to form a complete system for the organization of the Presbyterian church in the United States. In May, 1788, the synod completed the revision and arrangement of the public standards. The new arrangement consisted in dividing the old synod into four synods, namely, the synods of New York and New Jersey, of Philadelphia, of Virginia, and of the Carolinas, and constituting over these, as a bond of union, a general assembly, of essentially the same type with the general assembly of the church of Scotland. The Westminster confession of faith was adopted, with three slight alterations, and the larger and shorter catechisms, with but a single alteration, while the form of government and discipline of the Scottish church was slightly modified, to accord with our civil government and circumstances. No change has since been made, except that the form of government has been twice revised, one of the most important alterations having been an increase in the number of ministers requisite to send a delegate to the general assembly. Toward the close of the last century an extensive and powerful revival prevailed in Kentucky. A lack of ministers led many to favor the application of pious but uneducated men as candidates. Opposition to the project was strengthened by errors which had sprung up in connection with the revival. The severe measures of the synod, sustained by the action of the assembly, precipitated a secession, which became the germ of the Cumberland Presbyterian church, which in 1875 reported in connection with its general assembly 25 synods, 110 presbyteries, 2,250 congregations, 1,250 ministers, and 100,000 communicants. (See CUMBERLAND PRESBYTERIANS.)—In 1822, the synod of the Associate Reformed church having been brought, under the lead of Dr. John M. Mason, to favor union with the Presbyterian church, that union took place; but a very considerable minority refused to acquiesce in the measure, and retained a separate existence. During the 15 years that followed, the growth of the church was unprecedentedly rapid. New churches and presbyteries were multiplied in the middle and western states. Already measures had been adopted (1812) which resulted in establishing Princeton seminary, Union seminary in Virginia, and, though unendowed, the Southern and Western, at Marysville, Tenn. Auburn followed in 1816; the Western at Allegheny and Lane at Cincinnati in 1826–'7; Columbia, S. C., and Danville, Ky., in 1828; and Union at New York in 1836. The accessions from New England, at the time in full theological sympathy with the Presbyterian church, were provided for by the "Plan of Union" agreed to by the general association of Connecticut and the general assembly in 1801. It aimed to secure the rights and the harmonious coöperation of two denominations, entering the same field. For nearly a quarter of a century no fault was found with it; but it led to the representation in presbytery and general assembly of committeemen from Congregational churches, and these were found to favor voluntary missionary societies, not under the assembly's control. Of these societies, that for home missions, within a few years after its organization in 1826, had several hundred missionaries under its patronage. Most of these were from New England, and many of them were alike opposed to church boards and in sympathy with "New Haven theology." Parties were thus formed in the church, and the agitation on the subject of slavery, springing up at that time, tended to increase the alienation. The crisis came in 1837. The plan of union, through which, it was charged, the evils of the church had been introduced, was declared unconstitutional and void, and the four synods which had been organized under it were declared to be outside the Presbyterian church. Among these were many churches originally and soundly Presbyterian; and, indignant at an act of the assembly which they believed subversive of the constitution of the church, the New School resolved to maintain their rights. By preconcerted arrangement, at the assembly of 1838 they effected an organization for themselves and then adjourned to another place. As they withdrew, the Old School members who remained perfected their organization, and thus there were at once an Old and a New School assembly, bearing the same name and claiming the same rights. Litigation ensued, but no decision changed the relations of parties or the tenure of property save in some few instances. The New School was numerically the smaller body, and moreover was encumbered alike by its Congregational allies and its southern adherents. In the course of a few years the former fell off, and in 1857 the latter, under the lead of commissioners who had attended the assembly at Cleveland, O., prepared to withdraw and constitute the united synod, which was organized at Knoxville, Tenn., April 2, 1858. In connection with the synod were over 100 ministers and somewhat fewer than 200 churches, widely scattered over the southern states. This body continued a separate organization until Aug. 27, 1864, when it was merged in the general assembly formed by southern ministers and churches previously in the Old School connection. The Old School after 1837, with greater homogeneousness as well as greater strength than the New School, made more rapid progress, especially in the south and southwest. It had all its machinery of ecclesiastical boards in full and harmonious operation, meeting wants for which the New School had to provide by substantially the same methods, when they found that voluntary societies counterworked their policy. But in 1861, on the outbreak of the civil war, almost the entire body of the Old School southern churches, aggrieved by the assembly's resolution on the state of the country, withdrew their connection and united in the organization of a "General Assembly of the Presbyterian Church in the Confederate States of America." This organization was effected at Augusta, Ga., Dec. 4, 1861. The second assembly convened at Montgomery, Ala., May 1, 1862, since which time the meetings of the assembly have been annually held contemporaneously with those of the northern assemblies, and the church has perfected its organization for the work of ministerial education, home and foreign missions, publication, &c. The advance of the church, steady but not rapid, has been made in the face of great difficulties, and its present strength is represented by 11 synods, 55 presbyteries, over 900 ministers, and more than 1,500 churches, with a membership of about 90,000. The Old and New School bodies, retaining the same standards, and working more and more by analogous methods, were steadily approximating, while old alienations died away; and when the southern secession from the Old School brought it more into harmony with the New School on one very important issue, the way was prepared for those negotiations and conferences by committees—initiated when, in 1866, the two assemblies met in St. Louis—which resulted in the reunion of the two bodies, fully accomplished in 1871. The aggregate of synods and presbyteries was reduced when those occupying the same field were brought into the same organization, but the latest annual report to the assembly (1875) shows that there are in connection with it 36 synods, 173 presbyteries, 4,706 ministers, 4,999 churches, and 506,034 communicants. The contributions to home and foreign missions, education for the ministry, publication, freedmen, sustentation, and ministerial relief, for the year 1874-'5, amounted to $1,464,971.—Notwithstanding Presbyterianism has never prevailed extensively in New England, it has had a distinct and independent existence there from a very early period. The French church in Boston, formed of Huguenots about 1687, was the first church organized on a Presbyterian basis, but was continued no longer than while its service was conducted in the French language. The first Presbyterian organization in New England of any permanence dates back to about the year 1718, when a large number of Presbyterians, with four ministers, emigrated to this country from the north of Ireland. For some time, in cases of difficulty, the ministers and elders were wont to assemble informally, and hold what might be called *pro re nata* meetings; and where they were unable to reach a satisfactory result, they sometimes asked advice of the synod of Ireland. On April 16, 1745, the Rev. Messrs. John Morehead of Boston, David McGregor of Londonderry, N. H., and Ralph Abercrombie of Pelham, with Messrs. James McKeen, Alexander Conkey, and James Hughes, met in Londonderry, and "constituted themselves into a presbytery, to act, as far as their present circumstances will permit them, according to the word of God and the constitution of the Presbyterian church of Scotland, agreeing to that perfect rule." The body was called the Boston presbytery, and met, according to adjournment, in that town, Aug. 13, 1745. From the close of the year 1754 till October, 1770, there is a chasm in the records; but at the last mentioned period the presbytery consisted of 12 congregations and as many ministers. At a meeting held in Seabrook, N. H., on May 31, 1775, the presbytery resolved to divide itself into three distinct bodies, viz., the presbyteries of Salem, of Londonderry, and of Palmer; these were then formed into the synod of New England, which held its first meeting at Londonderry, Sept. 4, 1776. At Boothbay, Me., on June 27, 1771, a new presbytery was erected called the presbytery of the Eastward, consisting of three ministers and four ruling elders, representing four churches. It had no connection with the Boston presbytery, and its origin is said to have been in some way connected with the removal of the Rev. John Murray to Boothbay. It never exhibited on its roll more than eight ministers. Its last recorded adjournment now known was to meet at New Boston, N. H., on the first Wednesday of October, 1792. The only relic of this presbytery known to exist is a curious volume printed in 1783, with the following title: "Bath-Kol. A Voice from the Wilderness. Being an humble Attempt to support the sinking Truths of God against some of the principal Errors raging at this time. Or a joint Testimony to some of the Grand Articles of the Christian Religion, judiciously delivered to the Churches under their care. By the First Presbytery of the Eastward." In September, 1782, the synod of New England, finding their numbers considerably reduced in consequence of existing difficulties, agreed to dissolve and form themselves into the presbytery of Salem. For two succeeding years this presbytery met regularly in Massachusetts proper, but after this its meetings were held in the district of Maine. Its last meeting was held at Gray, Sept. 14, 1791. The third Associate Reformed presbytery, afterward called the Associate Reformed presbytery of Londonderry, was formed in Philadelphia, Oct. 31, 1782, and held its first meeting at Londonderry on Feb. 11, 1783. It ceased to belong to its original denomination in 1802, and was thereafter an independent presbytery till 1809, when it was received into the synod of Albany, and has since continued under the name of the presbytery of Londonderry. The presbytery of Newburyport was formed by the concurrent action of the presbytery of Londonderry and the synod of Albany. It held its first session in Boston on Oct. 27, 1826, and its last on Oct. 20, 1847, when it became reunited to the presbytery of Londonderry. The presbytery of Connecticut, consisting of several ministers and churches previously belonging to the presbytery of New York, was constituted by the synod of New York, Oct. 15, 1850, and held its first meeting at Thompsonville on Oct. 29. IV. UNITED PRESBYTERIAN CHURCH OF NORTH AMERICA. As this body is composed of the Associate Reformed and the Associate churches, it may be proper to present an outline of the history of each of these bodies up to the time of the union. 1. *Associate Reformed Church.* In 1680 Lord Cardross took measures for the establishment of a colony in South Carolina, with a view to furnish a place of refuge to his persecuted brethren. This was formed at Port Royal; but, in consequence of an invasion by the Spaniards, the colony was abandoned in 1688. Many, however, remained in Carolina, who were gathered into congregations under the care of a presbytery, which existed until about the close of the 18th century. The only one of these churches now remaining is the old Scots' church in Charleston. From 1660 to 1688 a large number of Presbyterians (amounting, according to Wodrow, to about 3,000) were transported to the American plantations and sold as slaves. They were for the most part sent to Virginia, Pennsylvania, and New Jersey; but scarcely any traces of their history now remain. The first minister sent to this country by the Secession church of Scotland was the Rev. Alexander Gellatly, who arrived in 1753, and, after a laborious ministry of eight years, died at Octorara, Pa. The Covenanters, or Reformed Presbyterians (ecclesiastical descendants of that portion of the church of Scotland which refused to accede to the revolutionary settlement of 1688, as established on the Erastian principle of conceding to the state power over the church), sent out the Rev. John Cuthbertson in 1751; and in 1774 he was followed by Messrs. Lind and Dobbin. Of these two denominations the Associate Reformed church was made up. In 1764 the Rev. Thomas Clark, minister of Ballybay in Ireland, belonging to the Burgher synod of Scotland, with the greater part of his congregation, emigrated to this country, and settled at Salem, Washington co., N. Y. Two other ministers of the same communion followed them two years after, though one of them subsequently returned to Scotland. The Burgher ministers, not being disposed to keep up a separate organization on this side of the Atlantic, united with their brethren; but the union was disturbed by the refusal of the Scottish synod to approve of it. The revolution of 1776 was chiefly instrumental in bringing about the union which produced the Associate Reformed church. During the progress of the war several conventions were held between the members of the Associate and the Reformed presbyteries with a view to the accomplishment of this end; the result of which was that three presbyteries met in Philadelphia in October, 1782, and formed themselves into a synod, under the name of the Associate Reformed synod of North America, on a basis consisting of the following articles: "1. That Jesus Christ died for the elect. 2. That there is an appropriation in the nature of faith. 3. That the gospel is addressed indiscriminately to sinners of mankind. 4. That the righteousness of Christ is the alone condition of the covenant of grace. 5. That civil government originates with God the Creator, and not with Christ the Mediator. 6. The administration of the kingdom of Providence is given into the hand of Jesus Christ the Mediator; and magistracy, the ordinance appointed by the moral Governor of the world, to be the prop of civil order among men, as well as other things, is rendered subservient by the Mediator to the welfare of his spiritual kingdom, the church, and has sanctified the use of it and of every common benefit, through the grace of the Lord Jesus Christ. 7. That the law of nature and the moral law revealed in the Scriptures are substantially the same, although the latter expresses the will of God more evidently and clearly than the former, and therefore magistrates among Christians ought to be regulated by the general directory of the Word as to the execution of their office. 8. That the qualifications of justice, veracity, &c., required in the law of nature for the being of a magistrate, are also more explicitly revealed as necessary in the Holy Scriptures. But a religious test, any further than an oath of fidelity, can never be essentially necessary for the being of a magistrate, except when the people make it a condition of government. 9. That both parties, when united, shall adhere to the Westminster confession of faith, the catechisms, the directory for worship, and propositions concerning church government. 10. That they shall claim the full exercise of church discipline without dependence upon foreign judicatories." On this basis all the members of the Reformed presbytery, and all the Associate ministers with the exception of two members of the presbytery of Pennsylvania, united. A small minority of the people in the two communions also declined to enter into it; and in these minorities have been preserved the Covenanter or Reformed Presbyterian denomination on the one hand, and the Associate on the other. The earliest settlements of the Associate Reformed church were in Pennsylvania, within the Cumberland valley; but colonies from these emigrated to South Carolina and Georgia, New York, Kentucky, and even to New Hampshire and Maine. One of the first acts of the synod, after its organization in 1782, was the adoption of a series of articles, afterward published under the name of "The Constitution of the Associate Reformed Church;" but these articles were severely attacked both by the Seceders and Covenanters, and were finally laid aside for a fuller exposition of the church's faith. The result was that the Westminster confession and the catechism, after a careful revision at several successive meetings of synod, in the articles relating to the power of the magistrate, were published in a volume in 1799, entitled "The Constitution and Standards of the Associate Reformed Church in North America." The ground occupied by this body was substantially the same with that held by the church in Scotland. For 20 years the growth of the church was very rapid; and this led to the adoption of a measure in 1803 which proved premature and adverse to its prosperity, namely, the division of the church into the four provincial synods of New York, Pennsylvania, Scioto, and the Carolinas, under a representative general synod. In 1804 the plan of the theological seminary was framed. Dr. John M. Mason was chosen professor of theology; and the sessions of the seminary began in the autumn of the same year in the city of New York. This was the second theological seminary established in the United States. Dr. Mason's work on "Catholic Communion," published in 1816, was regarded as being in conflict with the church's principles and practice; and this, in connection with some other grounds of complaint, led the entire synod of Scioto in 1820 to withdraw from the superintendence of the general synod. In 1821 the synod of the Carolinas petitioned the general synod to be erected into an independent synod, on the ground that they were so distant from the place at which the general synod usually assembled that it was impossible that they should be represented in it. The request was granted. For many years after that the southern synod gained but little in numbers, though in later years it became more prosperous; while the western synod rapidly extended itself and became more vigorous every year. About the time of the separation of the western synod, an unsuccessful attempt was made to unite the Associate Reformed and the Reformed Dutch churches, under the name of the Reformed Protestant church of North America. Immediately after this, measures were adopted for effecting a union between the Associate Reformed and the Presbyterian bodies; the consequence of which was that a portion of the former church became incorporated with the latter, and the library of the Associate Reformed church was immediately removed from New York to Princeton; though, as the result of a legal process, it ultimately fell back into the hands of its original owners. The act of union by the general synod of the Associate Reformed church was unconstitutional, being contrary to the express will of a majority of the presbyteries. However, many of the ministers and congregations who had remained under the care of the general synod went into this union. The synod of Pennsylvania with but few exceptions was merged in it, and that synod never met again. The synod of New York, however, survived the dissolution of the general synod, becoming separate and independent like its two sister synods of the west and south. But its interests languished till 1829, when it resolved to revive the seminary, whose operations had been suspended in 1821, and to establish it at Newburgh, under the care of the Rev. Joseph McCarroll, D. D., who was at the same time chosen professor of theology. An attempt was made in 1827 to revive the general synod on the old footing, but it proved a failure. However, the synod of the west, having divided into two, erected a general synod, which first met in 1841, and under which a union was formed with the New York synod in 1855. This united body, previous to the union with the Associate church in 1858, numbered 4 synods, 28 presbyteries, 253 ministers and licentiates, 367 congregations, and 31,284 communicants. The remaining synod, known since 1821 as the Associate Reformed synod of the south, still has its separate organization. Cordial in its relations with the United Presbyterian church, it has one missionary now laboring together with the missionaries of the latter church in Egypt. It has a literary institution named Erskine college and a theological school, both at Due West, S. C. It numbers about 70 ministers, nearly one third of whom are in South Carolina, the rest in other southern states. 2. *The Associate Presbyterian Church.* From 1782, the period of the formation of the Associate Reformed church, the Associate church was gradually increased by ministers sent out from Scotland, and also by the return of a considerable part of those who had previously joined the union. The first institution for the purpose of educating students in theology by this body was established in 1793, under the care of the Rev. John Anderson, D. D., of Beaver co., Pa. The presbytery of Pennsylvania, being unable to meet the applications for preaching which were made from Kentucky and Tennessee, directed the applicants to apply directly to the synod in Scotland for missionaries. They did so; and Messrs. Armstrong and Andrew Fulton arrived in Kentucky in the spring of 1798, and in November formed the presbytery of Kentucky. This accession of strength enabled these presbyteries to form themselves into a synod; and accordingly the synod, or court of review, designated as the Associate synod of North America, was constituted at Philadelphia in May, 1801. The synod consisted of 17 ministers, who were divided into the presbyteries of Philadelphia, of Chartiers, of Kentucky, and of Cambridge. Until the year 1818 appeals might be taken from the synod to that of Scotland; but at that time it was declared a coördinate synod by the general Associate synod of Scotland. Between the years 1838 and 1840 serious ecclesiastical difficulties arose, and several ministers were deposed or suspended. These, with a number of ministers and congregations in sympathy with them, at once organized separately, having several presbyteries, who constituted a synod and claimed to be the true Associate synod. This painful division was afterward adjusted, and a reunion was effected in 1854. In 1858, previous to the union with the Associate Reformed church, the Associate synod comprised 21 presbyteries, 231 ministers and licentiates, 293 congregations, and 23,505 communicants.—In May, 1858, the Associate Reformed and the Associate churches, having been separated for more than three quarters of a century, were reunited upon a common basis, under the name of the United Presbyterian church in North America. A small number on each side protested against the union. In 1875 this branch of the church embraced a general assembly, 8 synods, 56 presbyteries, 611 ministers, 777 congregations, and 76,063 communicants. It has theological seminaries at Newburgh, N. Y., Allegheny, Pa., and Xenia, O., and missionary seminaries at Sioot and Ramleh, Egypt. Westminster, Monmouth, and Ohio Central colleges are also under its charge. It has boards of foreign missions, of home missions, of publication, of church extension, of freedmen, and of education, with mission stations in China, India, Egypt, and Syria. Its periodical publications are one monthly, one semi-monthly, and two weekly newspapers. V. **Reformed Presbyterian Church in America.** At the union of the Associate and Reformed churches in 1782, a considerable number of the latter as well as of the former communion refused their assent to it, and they continued their original organization. Within ten years four ministers emigrated from Europe, to aid in maintaining the Reformed Presbyterian cause, the last of whom arrived in 1793. Two of them, Messrs. McKinney and King, in connection with Mr. Gibson, who had then lately come from Ireland, proceeded in 1798 to constitute a presbyterial judicatory independent of all foreign control. This was styled the Reformed presbytery of the United States of America. In arranging the terms of her communion, she declared that she adopted the Reformed Presbyterian system only in so far as it presents common truths, and "binds to duties not peculiar to the church in the British isles, but common in all lands." The government of the church is purely presbyterian; its doctrines are embodied in the Westminster standards; its worship is conducted in the simplest manner, without organs or hymns of human composition, and its distinguishing principle is Christ's headship over the nations. In 1808 a synod, composed of three presbyteries, was constituted under the name of the synod of the Reformed Presbyterian church in the United States of North America. In 1825 the supreme judicatory received the form of a representative assembly composed of delegates from presbyteries, and styled the general synod. In the "Declaration and Testimony" of the church, published in 1843, the synod, declaring its approval of the Westminster confession, is careful to disclaim any recognition of the power of the civil magistrate in ecclesiastical matters, adding: "All that appertains to the magistratical power in reference to the church is the protection of her members in full possession, exercise, and enjoyment of their rights. The magistratical office is civil and political, and consequently altogether exterior to the church." The members of this body have declined to exercise the right of suffrage, on the ground that they would thus sanction the omission from the constitution of the United States of any explicit acknowledgment of God as the author of civil society. Principally on this ground, several ministers and private members in 1833 seceded from the general synod of the church, and formed a separate organization, known as the general synod of the Reformed Presbyterian church, but which has never embraced more than 20 or 30 ministers. Reformed Presbyterians are scattered over the middle and western states, and they have a few congregations at the south. The church consisted in 1874 of 100 ministers, 105 congregations, and 10,000 communicants, and had one college, one theological seminary, one weekly newspaper, two monthly publications, and boards of foreign missions, domestic missions, and education. VI. **Presbyterianism in Canada.** Presbyterianism has had an existence in Canada at least from the conquest in 1759. The first Presbyterian minister we hear of is the Rev. George Henry, who went to Quebec in the year 1765. He was followed in 1784 by the Rev. Alexander Spark, and it appears that in the year 1787 the first Presbyterian congregation was organized in Quebec. It was composed of several pious soldiers and a few civilians. In the year 1780 the Rev. Thomas Bethune, a minister of the church of Scotland, who had come as chaplain of a highland regiment, preached first in Montreal, and afterward organized several congregations in the county of Glengary. In Montreal a Presbyterian church was organized about the year 1790. They built St. Gabriel street church, which is still used as a Presbyterian church, and is the oldest Protestant church in Canada. In Upper Canada, now known as the province of Ontario, the pioneers of Presbyterianism were sent out by the Reformed Dutch church. One of the principal laborers thus sent was the Rev. Robert McDowell, who was appointed by the classis of Albany as their missionary to Canada in 1798. He itinerated throughout the greater part of Upper Canada, forming and fostering congregations in various places. He died at a very advanced age in 1841. The Rev. W. Smart, who was sent out from England in 1811, and who labored long and faithfully in Brockville; the Rev. W. Bell, sent out from Scotland in 1817; the Rev. William Jenkins, originally from Scotland, who went to Canada from the United States in 1817; the Rev. Robert Boyd, from the synod of Ulster, ordained in 1821; and the Rev. James Harris, also from Ireland, who began his labors in 1820 as pastor of the first Presbyterian church in York (now Toronto), were among the founders of the Presbyterian church in Canada. To Kingston and a few other places ministers were on application sent out by presbyteries in Scotland, the Rev. John Barclay being the first minister of Kingston. In 1825 the Glasgow colonial society was formed, which sent out many ministers to Lower and Upper Canada, as well as to Nova Scotia and New Brunswick. These ministers were all of the church of Scotland. To Nova Scotia and New Brunswick the first Presbyterian ministers were sent from Scotland by the Burgher and Anti-Burgher synods. A missionary was also sent in 1768 by the united synods of New York and Philadelphia. About 1769 the real work of building up a Presbyterian church in Nova Scotia may be said to have begun, the Rev. David Smith and the Rev. Daniel Cock having been sent out by the Burgher or Associate synod of Scotland. Seventeen years afterward the Rev. James McGregor was sent out by the Anti-Burgher or General Associate synod. From these beginnings grew up the presbytery of Truro (Burgher), established in 1786, and the presbytery of Picton (Anti-Burgher), in 1795. In 1817 these united, forming the Presbyterian church of Nova Scotia. Ministers from the church of Scotland came at a later date. In 1831 was formed the synod of the Presbyterian church of Canada in connection with the church of Scotland. The "United Synod of Upper Canada," consisting chiefly of ministers of the Associate church of Scotland, with some from Ireland, was formed about 1819, but in 1840 was amalgamated with the synod in connection with the church of Scotland. Several ministers from the Secession church of Scotland came to Canada about 1832, and the number was increased from time to time. They were organized as the missionary synod of the United Secession church, and known afterward as the synod of the United Presbyterian church in Canada.—In 1844, the year after the disruption of the church of Scotland, a division took place in the Presbyterian church of Canada in connection with the church of Scotland, corresponding divisions taking place in Nova Scotia and the other maritime provinces. In Canada the new body took the name of the Presbyterian church of Canada. In 1861, after several years spent in negotiations, this body and the United Presbyterian church in Canada united under the designation of "The Canada Presbyterian Church," the corresponding bodies in the lower provinces uniting under the name of "The Presbyterian Church of the Lower Provinces."—In September, 1874, there were (omitting a few congregations connected with organizations in the United States) four Presbyterian bodies in the Dominion of Canada, viz.: the Presbyterian church of Canada in connection with the church of Scotland; the Canada Presbyterian church; the church of Scotland in Nova Scotia, New Brunswick, and adjoining provinces; and the Presbyterian church of the lower provinces. In the Presbyterian church of Canada in connection with the church of Scotland there were 11 presbyteries and 122 ministers; in the Canada Presbyterian church, 19 presbyteries and 329 ministers; in the church of Scotland in Nova Scotia, &c., 6 presbyteries and 31 ministers; and in the Presbyterian church of the lower provinces, 10 presbyteries and 124 ministers. There were theological colleges in Toronto and Montreal belonging to the Canada Presbyterian church; at Kingston and Quebec, to the Presbyterian church of Canada in connection with the church of Scotland; and at Halifax, to the Presbyterian church of the lower provinces. Nearly one half of the ministers in the several provinces have been supplied by the theological colleges of the country. A plan of union between these bodies was consummated June 15, 1875, only a small minority of the first named of them declining to accede to it. The aggregate of the united church at that date was 634 ministers, 1,119 congregations, 90,658 communicants, and a population under its instruction of about 650,000.—GENERAL COUNCIL. A plan for a general council of all the Presbyterian bodies throughout the world was formed at the meeting of the evangelical alliance held in New York in 1873. A conference of nearly 100 delegates from such of these bodies as had expressed their approval of the plan met by previous arrangement in London, July 21, 1875. It assumed the name of "Alliance of Reformed Churches throughout the World," and formed a constitution to serve as a basis of union, which is to be voluntary and coöperative, not organic. Its professed object is to promote mutual sympathy and help, diffuse information and thus aid in mission work, promote Christian reform in appropriate spheres, and oppose everywhere infidelity and religious intolerance. The integrity and autonomy of the constituent bodies is not to be interfered with; no ecclesiastical authority is to be assumed, and no doctrinal changes are to be required or imposed. The number of distinct Presbyterian bodies which, it is expected, will give in their adhesion, is nearly 50, embracing some 20,000 congregations.—BIBLIOGRAPHY. On the history of the Presbyterian church in Scotland, the following works may be consulted: Robert Wodrow's "History of the Sufferings of the Church of Scotland" (2 vols. fol., Edinburgh, 1721–'2); John McKerrow's "History of the Secession Church" (1839); Hetherington's "History of the Church of Scotland" (1843); McCrie's "Life of John Knox" (1813) and "Life of Melville" (1819); the younger McCrie's "Sketches of Scottish Church History" (1841); and the publications of the Wodrow Society (24 vols., 1842–'7). On the church in Ireland the best and main authority is the "History of the Presbyterian Church in Ireland," by James S. Reid (3 vols., 1834–'7), with a continuation by Killen (1853). On American Presbyterian church history, the principal works are Webster's "History," reaching only to 1758 (8vo, Philadelphia, 1857); Hodge's "Constitutional History of the Presbyterian Church," terminating in 1788, with the adoption of the present constitution (2 vols., Philadelphia, 1840–'41); Gillett's "History of the Presbyterian Church" (2 vols. 12mo, Philadelphia, 1864; revised ed., 1875), bringing the history down to the time of its publication; Sprague's "Annals of the American Pulpit" (Presbyterian, 2 vols. 8vo, New York, 1858); besides a large number of local histories. The minutes of the general assembly are published annually, and digests have been successively made, embodying up to the time of issue the leading measures of the church.

PRESCOT, a town and parish of Lancashire, England, 6 m. E. N. E. of Liverpool; pop. of the town in 1871, 5,990; of the parish (area 57 sq. m.), 80,520 (in 1861, 63,540). The parish stands on the edge of a rich and extensive coal field, and comprises several large villages. The town has long been a manufacturing place of importance. The drawing of pin wire had its origin here, and watch movements, watchmakers' tools, and coarse earthenware are manufactured. The parish church is an ancient edifice, with several monuments by Westmacott and Chantrey. In the vicinity are cotton and flax mills, collieries, potteries, and glass works.

PRESCOTT, an E. county of Ontario, Canada, bordering on Quebec, and bounded N. by the Ottawa river; area, 491 sq. m.; pop. in 1871, 17,647, of whom 9,623 are of French, 4,055 of Irish, 2,546 of Scotch, and 1,256 of English origin or descent. It is watered by the Petite Nation and other streams. Capital, L'Original.

PRESCOTT, a town and port of entry of Grenville co., Ontario, Canada, on the St. Lawrence river, opposite Ogdensburg, N. Y., with which it is connected by ferry, at the S. terminus of the St. Lawrence and Ottawa railway, and on the Grand Trunk railway, 220 m. E. by N. of Toronto, and 47 m. S. by E. of Ottawa; pop. in 1871, 2,617. It has about 50 stores, a branch bank, two iron founderies, three breweries, a distillery, a weekly newspaper, and four churches. The value of imports for the year ending June 30, 1874, was $281,289; of exports, $626,167.

PRESCOTT. I. Oliver, an American patriot, born at Groton, Mass., April 27, 1731, died there, Nov. 17, 1804. He graduated at Harvard college in 1750, practised medicine, was successively major, lieutenant colonel, and colonel in the militia, and in 1776 was appointed a brigadier general of the militia for the county of Middlesex, and became a member of the board of war. In 1777 he was elected a member of the supreme executive council of the state. In 1778 he was created third major general of militia throughout the commonwealth, and in 1781 second, but soon after resigned. In this year he received from the government a commission "to cause to be apprehended and committed to jail any person whom you shall deem the safety of the commonwealth requires to be restrained of his personal liberty, or whose enlargement within the commonwealth is dangerous thereto." In 1779 he was made judge of probate for the county of Middlesex, and held that post until his death. He was very influential in suppressing Shays's rebellion. **II. William,** an American patriot, brother of the preceding, born at Groton, Mass., Feb. 20, 1726, died at Pepperell, Mass., Oct. 13, 1795. He inherited a large estate. In 1755 he served successively as lieutenant and captain in the provincial army under Winslow during the expedition against Nova Scotia; and after the war he retired to his estate in Pepperell. On receiving the news of the battle of Lexington, he assembled a regiment of minutemen of which he was colonel, and marched to Cambridge. When the committee of safety decided to occupy Bunker hill, Prescott was selected for this perilous service, and on the evening of June 16 marched to Charlestown with a brigade of 1,000 men, and threw up the intrenchments behind which under his command the Americans met the British on the following day. It is the contemporary record, says Bancroft, that during the battle "no one appeared to have any command but Col. Prescott," and that "his bravery could never be enough acknowledged and applauded." He was among the last to quit the field, and immediately offered to retake the position if the commander-in-chief would give him three regiments. He served in the army for two years longer, and was present as a volunteer at the battle of Saratoga in 1777. After this battle he returned home, and subsequently sat in the legislature of Massachusetts for several years. **III. William,** an American lawyer, only child of the preceding, born at Pepperell, Aug. 19, 1762, died in Boston, Dec. 8, 1844. He graduated at Harvard college in 1783, studied law at Beverly, and practised there from 1787 to 1789, when he removed to Salem, which town he represented for several years in the legislature, and was subsequently elected by the federal party a state senator. In 1808 he removed to Boston, and in 1809 and for several years afterward was a member of the governor's council. In 1814 he was a delegate to the Hartford convention, and in 1818 was appointed a judge of the court of common pleas, which office he resigned at the end of a year. He was a delegate to the constitutional convention of Massachusetts, his last public office. He received the degree of LL. D. from Harvard college in 1824. **IV. William Hickling**, an American historian, son of the preceding, born in Salem, Mass., May 4, 1796, died in Boston, Jan. 28, 1859. His mother was the daughter of Thomas Hickling, for many years United States consul at the Azores. At the age of 12 he removed with his family to Boston; and he graduated at Harvard college in 1814. In the last year of his student life a classmate playfully threw at him a crust of bread, which struck one of his eyes, inflicting an injury which deprived the eye of sight except so much as sufficed to distinguish light from darkness. Excessive use of the other eye brought on a rheumatic inflammation, which deprived him entirely of sight for some weeks, and left the eye too irritable to be employed in reading for several years. Subsequently for some years he was enabled to use it for many hours of the day, but eventually it again became so weak that during the latter half of his life Mr. Prescott could only read for a few moments at a time, and could scarcely see to write at all. Soon after leaving college he travelled in England, France, and Italy, and resided for several months at Rome and Naples. On his return to Boston after two years' absence, he married and settled for life in his father's family. In 1819 he determined to devote the next ten years to the study of ancient and modern literatures, and to give the succeeding ten to the composition of a history. He accordingly applied himself to the study of French and Italian literature, and at one time meditated writing a life of Molière, for which he made an extensive collection of materials. This project, and another for the history of Italian literature, he reluctantly abandoned because of the great amount of reading which they involved. Of his studies in this direction the chief fruits were given to the public in a series of essays in the "North American Review" on "Molière," "Italian Narrative Poetry," and "Poetry and Romance of the Italians," which, with others on kindred topics, were printed in a volume of "Miscellanies" (London and Boston, 1845). About 1825 Mr. Prescott began to study Spanish literature and history, and selected as the subject of his first work the reign of Ferdinand and Isabella. He made at great expense a collection of materials for the illustration of the period in question, including various contemporary manuscripts, covering the whole ground of the narrative, none of which had been printed, and some of which were little known to Spanish scholars. But when his materials were collected, his eyes, which for a time had been well enough to enable him to read a few hours each day, became worse than ever. He obtained the assistance of a reader, who knew no language but English. "I taught him to pronounce the Castilian in a manner suited, I suspect, much more to my ear than to that of a Spaniard; and we began our wearisome journey through Mariana's noble history. I cannot even now call to mind without a smile the tedious hours in which, seated under some old trees in my country residence, we pursued our slow and melancholy way over pages which afforded no glimmering of light to him, and from which the light came dimly struggling to me through a half intelligible vocabulary. But in a few weeks the light became stronger, and I was cheered by the consciousness of my own improvement; and when we had toiled our way through seven quartos I found I could understand the book when read about two thirds as fast as ordinary English." At a later period Mr. Prescott obtained the services of a reader acquainted with Spanish and other languages of continental Europe. After more than ten years of labor the "History of Ferdinand and Isabella" was ready for the press. A few copies were privately printed and shown to Mr. Sparks, Mr. Ticknor, and other friends, whose cordial approbation at length encouraged the diffident author to publish the work. It appeared in Boston and London in 1837, in 3 vols. 8vo, was immediately received with great favor, and was soon translated into German, French, and Spanish; and the royal academy of history at Madrid elected the author a corresponding member. Six years of labor were next devoted to the "History of the Conquest of Mexico" (3 vols. 8vo, London and New York, 1843), and four years to the "Conquest of Peru" (2 vols. 8vo, 1847). These works were received with the highest favor in all parts of the civilized world. Prescott was elected a member of nearly all the principal literary bodies in Europe, and in 1845 was made a corresponding member of the institute of France. He received the degree of LL. D. from Columbia college in 1840, and from Harvard in 1843, and that of D. C. L. from Oxford university in 1850. In 1850 he made a short visit to Europe, passing a few months in England, Scotland, and Belgium. After his return he applied himself to the composition of a history of the reign of Philip II., for which he had made an extensive collection. The first two volumes appeared at Boston in 1855, and the third in 1858. The entire history was intended to comprise six volumes, but was never finished. On Feb. 4, 1858, he experienced a slight shock of paralysis, from the effects of which he soon recovered and resumed his literary pursuits. Eleven months afterward, while at work with his secretary in his study, he was struck speechless by a second attack, and died about an hour afterward. Besides his histories, Mr. Prescott wrote brief memoirs of his friends John Pickering and Abbott Lawrence, and supplied to a Boston edition of Robertson's "History of Charles V." a sequel relating the true circumstances of the emperor's retirement and death.—Mr. Prescott was tall and slender, with a fresh and florid complexion, and lively, graceful manners. In his habits he was singularly methodical, and regulated his daily life by an exact division of time. He rose early, and clothed himself according to the weather as indicated by the thermometer, putting on so many pounds of clothing more or less, his garments being all marked with their weight in pounds and ounces. He walked five miles each day in the open air, or, if the weather was stormy, in the house, in the latter case putting on his hat, boots, and gloves, and taking his cane as if out of doors. He always walked alone, if he could without discourtesy avoid having a companion, because while walking he occupied his thoughts in composition. To his literary labors he gave five hours daily, divided into three nearly equal portions of time, and for two hours a day listened to novel reading, which he thought stimulated his imagination and enhanced the animation of his style. His accounts of daily expenditures were kept with the greatest exactness, and one tenth of his income was always devoted to charity. From the middle of November to the middle of June he resided in Boston, at No. 55 Beacon street, where he had accumulated one of the finest private libraries in America, especially rich in Italian and Spanish books. The summer was passed at Nahant, where he had a cottage, and the autumn at Pepperell. In the last years of his life he abandoned Nahant and established his summer residence in the neighboring town of Swampscott. He carried his books with him to his seaside and rural residences, and wrote there with his usual diligence. He used a writing instrument made for the blind, consisting of a frame of the size of a sheet of quarto letter paper traversed by as many wires as there were to be lines on the page, and with a sheet of carbonated paper, such as is used for getting duplicates, fastened to the reverse side. With an ivory or agate stylus he traced his characters between the wires on the carbonated sheet, making indelible marks on the white page below. He wrote with great rapidity, in a hand so illegible that none could read it but himself and his secretary. The latter copied the manuscript as fast as written in a large and legible hand, on paper so ruled that there was twice the usual space between the lines to afford room for interlineation. When the chapter was finished, it was read to him several times, carefully revised, and again copied before being sent to the printer. He took comparatively little pains with his style, but was unwearied in his efforts to ascertain the truth of history.—See "Proceedings of the Massachusetts Historical Society in Memory of W. H. Prescott" (Boston, 1859), and "Life of W. H. Prescott," by George Ticknor (Boston, 1864). A new and revised edition of his works, edited by his last secretary, John Foster Kirk, has been published (15 vols., Philadelphia, 1874–'5).

PRESCRIPTION (in the Roman law, *præscriptio*), a title acquired by possession during the time and in the manner fixed by law. It is a natural and immutable principle, says Domat, that the owner of a thing shall remain so, and enjoy therefore all the rights of ownership, until his property is divested either by his voluntary act of alienation, or in some other legal mode. And it is another natural rule of the law, that he who has been for a long time in possession of a thing shall be regarded as the owner of it; because, in the first place, men are naturally careful not to give up what belongs to them, and in the second place, because it would be unreasonable to presume without proof that a possessor is a usurper. Yet, if the former of these rules, he continues, be carried to its furthest extent, it will follow that he who can show that either he or they through whom he claims have been owners of an estate will recover it from the possessor, no matter how long the latter or his ancestors may have been in possession, unless he (the possessor) can show a particular divestiture of the claimant's title. If, on the other hand, it is to be imperatively presumed that possessors are in all cases owners, injustice will sometimes be done by depriving of their property those who chance to be out of possession. Some arbitrary rule must therefore be contrived to reconcile these conflicting natural rights of owners and possessors. This end would obviously be attained by prescribing a time within which those who claim to be owners, but are not in possession, shall prove their rights, and after the lapse of which possessors who have not been evicted shall be maintained in their possession. That this obvious rule is also a reasonable one will appear, when it is remembered that occupancy and continued use make the very foundation of title to things, and that the requirement of uninterrupted possession for a given period is only an application of the universal rule of acquisition. As a rule of this nature is then essential, it will be found to exist in all systems of law. Here we have to do only with the prescription of our law. The cognate subject of limitation is treated elsewhere. (See LIMITATION, STATUTES OF.)—In strictness the common law allowed only incorporeal rights, such as easements, rights of way, and watercourses, to be prescribed for. Lands and corporeal rights were provided for by the statutes of limitation. Bracton, however, who was one of the earliest writers on the English jurisprudence, and who wrote before the statutes of limitation were so nicely developed as they now are, and who moreover borrowed much of his learning immediately from the Roman law, lays it down that undisturbed enjoyment may as well give title to corporeal as to incorporeal rights, and that was the principle of *præscriptio* in the code of Justinian. American law, though it has, like the English law, its prescription and its limitations, yet does not so strictly as that limit the application of either, but seems sometimes to hold with Bracton that prescription may as well apply to lands as to rights of common or way. The period which gives prescriptive right has varied in the law. Anciently the law required that the right claimed should have existed undisturbed from time immemorial, or, as the old phrase is, "from time whereof the memory of man runneth not to the contrary." When, by the statute of Westminster the first, in the time of Edward I., writs of right were limited to a certain period, it was thought reasonable that the period of prescription should have a like limitation, and claims of right were therefore declared to be indefeasible if they existed before the first day of the reign of Richard I. (July, 1189), but were invalidated if they had a later origin. By later statutes the period of limitation in real actions was still further reduced, and it would have been only reasonable to conform to it the time of legal memory or prescription. But this was not done, and for a long time it was left to the courts to remedy the unfairness by equitable constructions. They hit upon the device of presuming, in case of the long enjoyment of an easement, that there had been a formal grant, of which the evidence, that is to say, the deed, was lost. If this presumption was not rebutted by proof to the contrary, the occupant's title was confirmed. The effect was, that though prescriptive right commencing after the reign of Richard I. was not sustained, for the law on that point was explicit and still imperative, yet possession for a period far less even than that of legal memory sufficed to warrant the presumption of a grant. Prescription in its old sense was rarely pleaded, and time of legal memory came to be of little importance. But later, and particularly by the statute 2 and 3 William IV., the time of prescription was definitely limited by express enactments to periods varying from 60 to 20 years, according to the circumstances and the nature of the right claimed. The tendency of all modern legislation, indeed, is to substitute a short certain period in lieu of the old immemorial prescription. In the United States the policy of the law has been to make the time of prescription analogous to that of the statutes of limitation; in other words, to apply the same rule to like cases; so that we are gradually bringing the cognate matters of prescription and limitation together again, and throwing them under virtually one title, as they should be in fact, and as they are in foreign codes. At this time adverse, exclusive, and uninterrupted enjoyment for 20 years affords in most states conclusive presumption of right; in some, conforming to the statutes of limitation, it is still less; and in exceptional cases, as for instance where rights are claimed under judicial or tax sales, if the period is measured by the time allowed for bringing suits at law to recover lands, seven, five, and even three years may establish a presumption of right in some states. That the principle of prescription is introduced into our law with singular fitness will appear when it is remembered that in this country all titles, even the oldest, are comparatively recent; that unjust eviction might be in many cases easier than in older countries; that during the rapid settlement of large districts of the country the original instruments of conveyance were often rude and technically inexact; and finally, that in many localities the original settlers had no other right than that which occupancy gave them, a title which custom recognized at the time as sufficient, but of which subsequent grantees could show no written evidence.—In regard to the particular qualities of prescription, in the first place, the enjoyment of the right prescribed for must have been adverse; that is to say, it must either have invaded or limited the exercise of such a right of the owner as he could have asserted by action. Prescription therefore cannot be pleaded when possession has been enjoyed by the mere permission or license of the owner, for this recognizes the owner's title; in short, the possession must have been enjoyed as of the possessor's right. Possession must also have been uninterrupted; for he who ceases to hold possession seems himself to admit his lack of title. Claim of prescriptive right is also extinguished by unity of possession. Thus, if B has acquired by long enjoyment a right to have water flow through his land by artificial courses upon A's estate, and then A buys B's land, and makes a conveyance of the land which once was B's, the grantee cannot claim a prescriptive right to the watercourses. Moreover, the right claimed by prescription must have been certain and reasonable. There can be no prescriptive right to do a wrong, or anything that would be a nuisance to another; nor can exclusive right be prescribed for in respect to a common privilege, for example, by one who has pastured his cattle for the prescribed period upon a common or a highway, or has enjoyed a way along a beach which is used in common by fishermen, fowlers, weed-gatherers, &c. Yet, as a member of the community, an individual may assert prescriptive right in a public easement, as for example in a common landing place or a highway.

PRESENTATION, Order of. See SISTERHOODS.

PRESERVATION OF FOOD. Articles of food (see ALIMENT) are very complex in their chemical constitution, and are exceedingly prone to return to the simpler and more stable compounds called inorganic. (See EREMACAUSIS, and FERMENTATION.) The principal promoters of such decomposition are moisture, oxygen, and certain minute organisms. The art of preserving food in a manner to retain its flavor and natural qualities is chiefly modern, as the ancients only understood rude methods, the principal of which were drying and salting.—Fruits may be preserved in six principal ways: 1. In the natural state. Most fruits, such as berries, peaches, and plums, can be kept in the natural state only a short time, except when frozen or near the freezing point. In a good refrigerator, kept cool by a circulation of cold dry air, these more perishable fruits may be kept in a natural state for many days. This is also the best method of preserving melons and oranges. Apples and pears may be kept in cool dry apartments put up in barrels. Well selected apples, enclosed in compact tissue paper and carefully packed in barrels, may be preserved for nearly or quite a year. Pulverized charcoal dust is a very good material in which to pack the fruit. 2. Boiling and adding sirup, or the method of making what are commonly called "preserves." These are in three forms: whole or sliced fruit, jam, and jelly. When preserved whole or sliced, they may be boiled in a sirup made of two pounds of sugar to one of water, the quantity of sirup varying in particular cases, but as a general rule being about once and a half the volume of fruit. They may also be heated alone with sugar, or packed in sugar without heating. Their keeping properties are of course increased by the coagulation of the albumen by heat and the destruction of ferments. Jams are made by reducing the fruit to a pulp (sometimes removing the skin and the seed, but often allowing them to remain in the mass for flavoring), and conducting the subsequent processes on the same principles as for whole fruit, excepting that jam is always cooked, and should as a rule contain rather more sugar. Jellies are made by boiling the fruit in a small portion of water, straining, and adding sugar, usually in quantities equal to the juice. All these preserves are better kept in glass jars, because they allow inspection to detect incipient fermentation, which may be arrested by immediate reboiling and reduction of mass by evaporation. The jars may be covered with air-tight caps fitted with gum elastic, or, what is quite as good, with white paper glazed with white of egg. A tough leathery mould after a time usually forms upon the surface of the preserves, which is considered by good housekeepers as a protection against fermentation. 3. Boiling and sealing in air-tight cans, with little or no sugar added, the principle of preservation being the destruction and exclusion of ferments, and also the exclusion of air. The jars are sealed with screw and gum elastic covers, or with solder, while they are filled with the fruit and steam. When the steam condenses, a vacuum remains. This method is carried on to a great extent in the principal fruit-growing districts, millions of cans being sent annually to the great markets. 4. Fruits are dried in various ways. Berries are simply exposed, on boards or coarse cotton cloth or gauze, to the heat of the sun, or in the shade to a current of warm dry air. Apples, pears, and peaches may be cut into pieces and dried in the same way. When they reach the requisite degree of dryness, indicated by a tough condition well known to the experienced housekeeper or fruiterer, the juice has become sufficiently inspissated to resist the action of ferments; and they may be protected from mould for many months by keeping them in a cool dry atmosphere. 5. Fruits may be frozen and their qualities retained for a long time in this condition, and in the absence of good refrigerating apparatus the crude process of freezing may be resorted to; but keeping them in refrigerators at or a little above a temperature of 32° F., and considerably above the freezing point of the juices, is to be preferred. South American and West Indian fruits, and those raised in the southern states and California, are now commonly sent north in refrigerators. 6. By immersion in strong brine and subsequent preserving in vinegar, or by primary immersion in vinegar, alcohol, or brandy. The method with brine and vinegar is known as pickling, and is generally employed with those articles which are termed vegetables instead of fruits, although peaches, plums, cherries, and berries are often preserved in vinegar. (See PICKLES.)—Animal food may be preserved by several methods, of which the following are the chief: 1. By immersion in a solution of common salt, to which a small portion of saltpetre is often added, called brine. This acts by abstracting the juices from the meat, and also by preventing the development of organic germs and lessening the tendency to molecular change. 2. By packing the meat in salt, whereby the juices are abstracted; then removing it and allowing it to dry, and packing in boxes or barrels. 3. By rubbing with common salt, and drying in the sun, or in a current of dry air. 4. By salting and smoking, by which means, in addition to the abstraction of moisture by the salt, pyroligneous acid and creosote act upon the flesh, causing it to contract and harden, and also preventing the development of mould. 5. By drying in a current of warm air at about 140° F., or in the open air at even a lower temperature, when the air is comparatively free from ferment germs. The latter method has long been practised, especially for "jerked beef," throughout Spanish America and in the warmer parts of the United States. This dried meat may be reduced to powder, packed in air-tight cans, and preserved for a long time. When mixed with fat, it forms the pemmican used in arctic voyages. Spices and dried berries are sometimes added to it. (See PEMMICAN.) 6. By cooking, to coagulate the albumen, and then enclosing in air-tight cans with exclusion of air, after the manner of canning fruits. 7. By cooking and pickling in vinegar, a common method of preserving oysters, lobsters, and fish. Cooking and seasoning, and covering with melted lard or olive oil, is a common method of preserving very small fish. (See Sardine.) 8. By refrigeration and freezing, a process now extensively practised in all civilized countries, fresh beef being carried from South America to all parts of the world, and in the United States from the Pacific to the Atlantic coast. The trade in frozen herring from the coast of Maine and the bay of Fundy has recently grown immensely. (See Freezing, Artificial.) Milk is preserved by evaporating it to the consistency of thick sirup, in which condition it resists the motion of ferments; or by reducing it to a solid state, and adding a portion of salt. (See Milk.) There are several special methods, having particular names, which might be classified under some of the above heads. Appert's method, introduced in France about 1810, for which he received a prize of 12,000 francs from the board of arts and manufactures in Paris, and which was afterward patented in England and improved by Donkin, Hall, and Gamble, consists principally in cooking the meats at a temperature of about 240°, and sealing in air-tight jars. The process has been further improved by McCall and co., who add a small quantity of sulphite of soda (12 grains to every pound of meat), to absorb traces of oxygen which may have been left. Still another improvement is the application of entrance and exit tubes, the exhaustion of air through these by an air pump, and subsequently the passing through the can of nitrogen gas to remove all oxygen, and then of a small quantity of sulphurous acid, and after this of nitrogen; after which the can is hermetically sealed. The merit claimed for this process is that the meat may be preserved without cooking. The process of Prof. Morgan of Dublin consists in forcing into the aorta of the recently slaughtered animal, and thence throughout the capillary and venous system, a strong brine, containing a small portion of saltpetre, by which means the blood is forced out of the system at the same time that the meat is salted. It may then be cut into pieces, and dried and smoked, or preserved in brine. One objection to this process is that it washes out nutritive material. By Dr. Endemann's process the meat is cut into thin slices and dried in a current of warm air not exceeding 140° F. It may then be ground into powder, kept in air-tight cans, and used for making soup. M. Laujorrois has lately communicated to the French academy a method of preserving food by the use of fuchsine (aniline red, rosaniline, or magenta). A vessel containing a solution of gelatine treated with a minute quantity of fuchsine 11 months before, and open to the air ever since, was exhibited, and was found in a perfect state of preservation.

PRESERVATION OF WOOD. In its natural state the durability of wood depends upon the variety of tree from which it is taken, the time of felling, the manner of drying, and the conditions in which it is placed. Natural wood in deep fresh water will last for centuries, as it is not liable to attacks of worms as it is in sea water, and its depth of immersion preserves it from eremacausis. Alternate exposure to air and water, or continued exposure to air and moisture combined, is most favorable to the decay of wood, especially if accompanied by warmth; but different kinds of wood have vastly different powers of resisting such influences. (See Wood.) Pure woody fibre is much less affected by the action of air and moisture than when it contains starchy, gummy, and albuminous matter. If felled in winter, after the sap has been mostly converted into woody fibre, it is more durable than if felled in summer. Kiln drying is the ordinary method of preserving wood which is to be worked by the carpenter or cabinet maker, by which the water is eliminated, and the albuminous and gummy constituents hardened. The constituents of the sap may be removed by boiling the wood in water or subjecting it to the action of steam, alternate vacuum exhaustion and injection, if desired, aiding in the process of removal. This mode of treatment is practised when it is desirable that the grain and color of the wood be preserved. The constituents of the sap may also be changed by the action of chemicals, and these may be introduced by first exhausting the air and vapor from the pores of the wood and then letting into the receiver a strong solution of the preserving substance. In England several scores of patents have been issued for processes for the preservation of animal and vegetable substances, including timber, of which only four were in the last century, the earliest being in 1737. The first process for preservation by chemicals which was extensively applied was that of Mr. Kyan, which was patented in England in 1832, and some time afterward introduced into the United States by the inventor. The wood was steeped in a solution of corrosive sublimate, or it was placed in an exhausting cylinder and the solution forced in under atmospheric pressure. Its expensiveness, however, and the difficulty of conducting it, have prevented this process, called kyanizing, from being widely employed. Of the preparations now in use in England, that of Mr. J. Bethel, consisting of the oily mixtures obtained by a rough distillation of the tarry liquor of gas works, is considered as very efficient. A solution of pyrolignate of iron is also regarded as a good preservative. Because of the presence of creosote in these liquors and its known antiseptic property, the process is called creosoting, and is effected by the method of exhaustion and subsequent injection by intense pressure (150 lbs. or more to the square inch), which is continued for 48 hours or longer. The process is adopted by many of the railway companies of England, and notwithstanding its expensiveness is highly approved of. Wood thus prepared is said to be also protected against the *teredo navalis* or ship worm. In France the process of Dr. Boucherie has been extensively employed for railway and ship timber. The material used is sulphate of copper dissolved in water so that at a temperature of 60° the density of the solution is about 1·006. A water-tight cap is fastened on one end of the log, and into this is inserted the end of a vertical tube, 30, 40, or more feet in height, into which the solution is poured. The hydrostatic pressure first forces out the sap, and then the solution enters the pores of the wood. Timber thus prepared at Fontainebleau was fully impregnated in 24 hours in lengths of 7 ft.; but sticks of the same timber 40 ft. long required 10 days for the completion of the process. Another process employed in both England and France is that of Mr. Payne, patented in 1841. The timber is introduced into a long iron cylinder, which is then closed air-tight; steam is driven in, expelling the air through a valve, and a cold solution of sulphate of iron is pumped in, which condenses the steam and produces a partial vacuum. This is made more complete by the air pump, and the cylinder is then filled with the solution, which is still forced in under considerable pressure. In a few minutes the solution is let out and the cylinder is again filled with air. This is again expelled by steam, and a solution of another salt is admitted, of such a character as will react upon the sulphate of iron, producing double decomposition and leaving in the pores of the wood an insoluble salt. Chloride of calcium answers this purpose, and the insoluble sulphate of lime remains in the wood, the chloride of iron being dissolved out. Carbonate of soda may be substituted, in which case insoluble carbonate of iron is formed, the soluble salt being sulphate of soda. The process of Sir William Burnett, called "burnettizing," patented in 1838, is often used. This consists in injecting chloride of zinc solution into the timber after the pores have been exhausted of air. The process was extensively employed in 1850 at Lowell, Mass., for the locks on the Merrimack river. Wood may be preserved by immersing it when thoroughly dried in a solution of paraffine, heated under a pressure of six or eight atmospheres. The solvent, which may be coal naphtha, is then distilled off, to be used again. The Seeley process consists in subjecting the wood to a temperature between 212° and 300° F. while immersed in a bath of creosote for a sufficient time to expel the moisture. The pores are then filled only with steam, and the hot oil is replaced with cold, which creating a vacuum in the pores, they are filled with the oil.

PRESHO, a S. county of Dakota, recently formed and not included in the census of 1870; area, about 1,600 sq. m. It is bounded N. E. by the Missouri, and is intersected by White river and Medicine creek. The surface consists of rolling prairies.

PRESIDENT (Lat. *præses*), an officer appointed or elected to preside over a tribunal, a company, an assembly, or a republic. The chief executive officer of the United States bears this title, and the second executive officer, the vice president, is by virtue of his office the president of the senate, and succeeds to the office of president of the United States on the death or disability of the regular incumbent during his term. The chief executives of Mexico and the republics of Central and South America, as well as of Switzerland, are also termed presidents, and Marshal MacMahon governs under the same title in France. The president of the United States holds his office for the term of four years, beginning on the 4th day of March next succeeding the day of his election. He must be a native of the United States, at least 35 years old, and is chosen by electors who are themselves chosen by the people. Each state is entitled to a number of electors equal to its number of senators and representatives in congress, who meet at their respective state capitals on the first Wednesday in December after their election, and transmit their votes to the president of the United States senate. The votes are canvassed by the two houses of congress in joint convention, and the result declared, on the second Wednesday of February following the meeting of the electors. Under the original provisions of the constitution the person having the second highest number of votes for president became vice president; but the twelfth amendment (1804) provides for the separate election of those officers. The president's powers are thus fixed by the constitution of the United States, article II., section 2: "The president shall be commander-in-chief of the army and navy of the United States, and of the militia of the several states when called into the actual service of the United States; he may require the opinion in writing of the principal officer in each of the executive departments, upon any subject relating to the duties of their respective offices, and he shall have power to grant reprieves and pardons for offences against the United States, except in cases of impeachment. He shall have power, by and with the consent of the senate, to make treaties, provided two thirds of the senators present concur; and he shall nominate, and, by and with the advice and consent of the senate, shall appoint ambassadors, other public ministers and consuls, judges of the supreme court, and all other officers of the United States, whose appointments are not herein otherwise provided for, and which shall be established by law; but the congress may by law vest the appointment of such inferior officers as they think proper in the president alone, in the courts of law, or in the heads of departments. The president shall have power to fill up all vacancies that may happen during the recess of the senate, by granting commissions which shall expire at the end of their next session." Section 7 of article I. requires that every bill which passes congress must have the president's signature to become a law, unless, after he has returned it to congress with his objections, two thirds of each house shall vote in its favor. The president's duties, as determined by article II., section 3, are to give to congress from time to time information of the state of the Union, and recommend to their consideration such measures as he shall judge necessary and expedient; to convene both houses on extraordinary occasions, and, in case of disagreement between them as to the time of adjournment, to adjourn them to such a time as he shall think proper; to receive ambassadors and other public ministers; to take care that the laws be faithfully executed; and to commission all the officers of the United States. He can be removed from office on impeachment for and conviction of treason, bribery, or other high crimes and misdemeanors. The presidents of the United States from the adoption of the constitution till the present time have been as follows: George Washington, 1789 to 1797; John Adams, 1797 to 1801; Thomas Jefferson, 1801 to 1809; James Madison, 1809 to 1817; James Monroe, 1817 to 1825; John Quincy Adams, 1825 to 1829; Andrew Jackson, 1829 to 1837; Martin Van Buren, 1837 to 1841; William Henry Harrison, March 4, 1841, to April 4, 1841, when he died and was succeeded by John Tyler, the vice president, who held office till 1845; James Knox Polk, 1845 to 1849; Zachary Taylor, 1849 to July 5, 1850, when he died and was succeeded by Millard Fillmore, the vice president, who held office till 1853; Franklin Pierce, 1853 to 1857; James Buchanan, 1857 to 1861; Abraham Lincoln, 1861 to April 15, 1865, when he died, and was succeeded by Andrew Johnson, the vice president, who held office till 1869; Ulysses S. Grant, 1869 to the present time (1875). It will be seen that Washington, Jefferson, Madison, Monroe, Jackson, Lincoln, and Grant were each twice elected, and that Tyler, Fillmore, and Johnson succeeded to the office from being vice presidents when vacancies occurred. Three other presidents, John Adams, Jefferson, and Van Buren, were vice presidents previous to their election to the principal office.

PRESIDIO, a S. W. county of Texas, separated from Mexico on the south by the Rio Grande; area, about 14,500 sq. m.; pop. in 1870, 1,636, of whom 489 were colored. It is supposed to contain valuable minerals, but has been little explored. There is some good farming land in the valleys of the Rio Grande and other streams. It is better adapted to grazing, but is deficient in water. It is unorganized, and is subject to Indian incursions.

PRESQUE ISLE, a N. E. county of the S. peninsula of Michigan, bordering on Lake Huron; area, about 700 sq. m.; pop. in 1870, 355. It is watered by several streams and lakes. The surface is undulating and the soil moderately fertile. Capital, Rogers City.

PRESS, Printing. See PRINTING.

PRESSENSÉ, Edmond Déhault de, a French theologian, born in Paris, Jan. 7, 1824. He studied at Lausanne under Vinet, attended lectures in Berlin and Halle, and in 1847 assumed the charge of a free Protestant chapel in Paris. In 1871 he was elected as a republican to the national assembly. He belongs to the conservative branch of French Protestantism. His principal works are: *Histoire des trois premiers siècles de l'Église chrétienne* (4 vols., Paris, 1858–'61); *Jésus-Christ, son temps, sa vie et ses œuvres* (3d ed., 1866); *Le concile du Vatican* (1872); *La liberté religieuse en Europe en* 1870 (Paris, 1874); and *La vie morale des premiers chrétiens* (1875). The first two works have been translated into German and other languages. He has also published several volumes of sermons, essays, and controversial treatises, and translated Neander's commentary on the Epistle to the Philippians, and is the chief editor of the *Revue chrétienne*, which he founded.—His wife, a Swiss lady, has written several books for the young (1854–'61).

PRESTER JOHN, the name given by Europeans in the middle ages to a supposed Christian sovereign or dynasty of sovereigns established in the interior of Asia. The name occurs first in the 11th century, and according to one account he was an eastern potentate dwelling beyond Persia, who, having been converted to Christianity by the spirit of a departed saint, caused his subjects to adopt the same faith. He was at once sovereign and priest of his people (whence his name Prester or Presbyter), and his sway, in its pastoral simplicity and benignity, was compared to that of kings in the patriarchal times. This story was found to be a mere fancy. The belief in the existence of Prester John, however, took a more tangible shape in the 13th century, and on the authority of some Nestorian priests he was said to be identical with Ung Khan, a powerful Tartar chief living in Karakorum, in eastern Tartary, who was overthrown and slain by Genghis Khan. Giovanni Carpini, a Franciscan friar, who in 1246 was sent on a mission to Batu Khan, the grandson of Genghis, failed to discover the Christian monarch or his subjects, but supposed him to be established further to the eastward. A few years later another Franciscan, Rubruquis, penetrated as far as the court of Batu Khan in central Tartary, and was thence forwarded to Karakorum, the residence of Mangu Khan, and the supposed seat of Prester John. His search for the latter was unavailing, but from a few Nestorian priests whom he met there, he ascertained that Ung Khan had encouraged the propagation of Christianity in his dominions. The existence of Prester John nevertheless continued to be believed, and as late as the close of the 15th century the Portuguese, who had reached India by the way of the cape of Good Hope, made fruitless inquiries for him there. About the same time Peres da Covilham, a Portuguese, made a journey to Abyssinia in quest of the kingdom of Prester John; and finding the *negus* or king of Habesh to be a Christian prince, he conferred the title upon him. Mosheim, in his "Ecclesiastical Institutes," conjectures that Prester John may have been a Nestorian priest, who, gaining possession of a throne in eastern Tartary, transmitted his title as well as his name to his successors. Others have supposed him to be identical with the grand lama.

PRESTON, a N. county of West Virginia, bordering on Pennsylvania and Maryland, and intersected by Cheat river; area, about 600 sq. m.; pop. in 1870, 14,555, of whom 118 were colored. It occupies a valley between the Chestnut ridge on the west and the Alleghany ridge on the east, and the soil is very fertile. Iron ore, coal, sandstone, and slate are found, and there is extensive water power. It is traversed by the Baltimore and Ohio railroad. The chief productions in 1870 were 33,695 bushels of wheat, 20,580 of rye, 145,004 of Indian corn, 189,070 of oats, 27,346 of buckwheat, 11,961 tons of hay, 58,388 lbs. of wool, 193,233 of butter, 18,932 of honey, and 8,521 gallons of sorghum molasses. There were 3,596 horses, 4,526 milch cows, 6,423 other cattle, 23,336 sheep, and 6,703 swine; 2 manufactories of pig iron, 10 tanneries, 19 saw mills, and 4 woollen mills. Capital, Kingwood.

PRESTON, a town of Lancashire, England, on the right bank of the river Ribble, 190 m. N. W. of London; pop. in 1871, 85,427. It occupies an eminence rising from the river, here spanned by a handsome railway viaduct, 68 ft. high. The staple manufacture of Preston was originally linen, which is still made to some extent, but has been completely eclipsed by cotton. There are more than 50 cotton mills, besides manufactories of worsted, machinery, &c. Vessels of 300 tons can ascend to the quays. Preston owes its name, originally Priests' Town, to the number of religious houses it contained. In 1873 the number of places of worship was 48, of which 16 belonged to the church of England.

PRESTON, Thomas Scott, an American clergyman, born in Hartford, Conn., July 23, 1824. He graduated at Trinity college, Hartford, in 1843, and at the General theological seminary, New York, in 1846. He was assistant rector of the church of the Annunciation and subsequently of St. Luke's, in New York, till 1849, when he went to St. Joseph's theological seminary, Fordham, and was ordained in the Roman Catholic church in 1850. After serving as an assistant at the cathedral in New York, and as pastor of St. Mary's church, Yonkers, N. Y., he was in 1853 appointed chancellor of the archdiocese of New York, and in 1873 vicar general in connection with the duties of chancellor. Since 1861 he has also been pastor of St. Ann's church. He has published "Ark of the Covenant, or Life of the Blessed Virgin" (New York, 1860); "Life of St. Mary Magdalene" (1860); "Sermons for the Principal Seasons of the Sacred Year" (1864; enlarged ed., 1866); "The Purgatorian Manual," a selection of prayers and devotions (1866); "Lectures on Christian Unity" (1866); "Reason and Revelation" (1868); "Christ and the Church" (1870); "The Vicar of Christ" (1871); and lectures on the "Devotion of the Sacred Heart" (1874), and other subjects.

PRESTON, William Campbell, an American statesman, born in Philadelphia, Dec. 27, 1794, died in Columbia, S. C., May 22, 1860. He was of a Virginia family, and was born while his father was a member of congress in Philadelphia. He graduated at the state college in Columbia, S. C., in 1812, returned to Virginia, and commenced the study of the law, but after a few months was compelled to travel for the benefit of his health. After an extensive tour through the valley of the Mississippi, he visited Europe, where he remained several years, and at the university of Edinburgh attended the lectures of Professors Playfair and Brown. In 1819 he returned to Virginia, and in 1820 was admitted to the bar. Two years afterward he settled at Columbia, S. C., and soon gained a reputation as a public speaker. In 1828, and again in 1830-'32, he was returned to the state legislature, and became one of the leaders of the nullification party. In 1836 he was elected to the United States senate; but differing with his colleague, Mr. Calhoun, and his constituents in regard to the support which they gave to Mr. Van Buren, he resigned his seat and resumed the practice of the law. He was president of the South Carolina college from 1845 to 1851, and soon after established the Columbia lyceum, which he endowed with his library of 3,000 volumes. He published a eulogy of Hugh S. Legaré in 1843.

PRESTONPANS, a village in Haddingtonshire, Scotland, on the frith of Forth, 8½ m. E. of Edinburgh, where was fought a memorable action between the Scottish Jacobites under the young pretender, Charles Edward, and the royal troops under Sir John Cope, Sept. 21, 1745. The opposing armies came within sight of each other on the afternoon of the 20th, Cope occupying a strong position adjoining the village of Prestonpans, and having his front protected by a deep morass, while the pretender's troops, mostly highlanders, were posted on a ridge about a mile distant. The royalists had about 2,200 men, with six pieces of artillery, and the insurgents 2,500; but in appointments and discipline the former had decidedly the advantage, the highlanders being a hastily gathered rabble, roughly armed. The armies bivouacked in sight of each other. At midnight the pretender was informed that a path leading to the plain below and avoiding the morass had been discovered, and it was determined to march at once to the attack.

The highlanders reached the plain in safety, but Cope's forces had been alarmed by the firing of their outposts, and were drawn up to receive them. As the sun rose, the highlanders, who were formed in two lines, the second of which was led by the pretender, uncovered, uttered a short prayer, and rushed with a terrific yell upon their enemy. The artillery and dragoons were overpowered, and the infantry, uncovered at both flanks, were completely routed after a brief though brave resistance. "So rapid was this highland onset," says Lord Mahon, "that in five or six minutes the whole brunt of the battle was over." Of the royal army about 400 were slain (among them the celebrated Col. James Gardiner), and the pretender lost about 100, killed and wounded. The battle was called by the Jacobites that of Gladsmuir, out of respect to a passage in a book of prophecies printed in Edinburgh in 1615, "On Gladsmuir shall the battle be," although that place is a mile distant from the field of conflict. On the following day the pretender made a triumphal entry into Edinburgh.

PRESUMPTION, in law, an inference or assumption made in the absence of evidence. Presumptions are divisible into conclusive presumptions and disputable presumptions. Conclusive presumptions answer to the *præsumptio juris et de jure* of the civil law. The law asserts them to be true, and will not permit evidence to deny or refute them. A familiar illustration may be found in the rule that a debt which has run 20 years, whether under seal, or by judgment, or resting on other evidence, is conclusively presumed to have been paid. If it be sued one day before the 20 years expire, the creditor need only prove the debt, and the debtor must prove that he has in some way satisfied it. But if it be sued one day later, not only is the debtor relieved from the necessity of proving payment, but the creditor will not be permitted to prove that the debt has not been paid. If the creditor can prove anything which the law would recognize as a new promise within 20 years, the suit may be maintained on this new promise, but the old debt is conclusively settled. Another common instance is the rule in respect to land, possession of which under a claim of absolute ownership for a certain period constitutes a conclusive presumption of a valid grant, which cannot be disturbed by evidence. (See Limitation, Statutes of, and Prescription.)—Conclusive presumptions are not very common in the law; but disputable or rebuttable presumptions, answering to the *præsumptio juris* of the civil law, constantly occur. They are indeed little more than legal inferences from existing evidence, open to modification or reversal by further evidence. They are much the same with *prima facie* conclusions or inferences; as, for example, when one sues on a promissory note, and proves his own possession and the signature of the maker, the law presumes the plaintiff to be the owner of the note, and also presumes consideration, and gives the plaintiff his case, unless the defendant overcomes the presumption by evidence on his part of some ground of defence. The general presumptions of innocence in favor of an alleged criminal, and of absence of debt in favor of a defendant in a civil suit, are of this kind. It will be seen therefore that disputable presumptions do little more than determine where the burden of proof rests.

PRETI, Mattia (called Il Calabrese), an Italian painter, born at Taverna, Calabria, in 1613, died in Malta in 1699. He studied under Lanfranco and Guercino, and painted in the manner of the eclectic Bolognese school. Among his chief undertakings was a series of frescoes in the cathedral of Malta illustrating subjects from the life of St. John the Baptist. Many of his works were executed for churches in Rome, Bologna, Venice, and Naples. He was noted for inventive power and boldness. His subjects are generally gloomy or tragic.

PREUSS, Johann David Erdmann, a German historian, born in Landsberg on the Warthe, April 1, 1785, died in Berlin, Feb. 24, 1868. He was teacher of history and literature at the Frederick William institute in Berlin for more than 40 years, historiographer of the Prussian dynasty, and biographer of Frederick the Great and editor of his *Œuvres* (30 vols., Berlin, 1846-'57). Among his later works is *Friedrich der Grosse im siebenjährigen Kriege und in seinen späteren Regentensorgen* (1856).

PRÉVOST, Pierre, a Swiss physicist, born in Geneva, March 3, 1751, died there, April 8, 1839. He studied theology and law, took his degrees as advocate and doctor in 1773, and was a private teacher in Holland and Paris till 1780, when he went as professor of philosophy to Berlin. He returned to Geneva in 1784, and became in 1793 professor of philosophy there, and in 1810 of natural sciences; and from 1814 to 1823 he was also a member of the representative council of Geneva. He edited Greek classics, translated works by Adam Smith and other English writers, and published works on philosophy and political economy. He is known by his theories relating to radiant heat, called Prévost's "theory of exchanges." His principal works are: *De l'origine des forces magnétiques* (Geneva, 1788); *Recherches physico-mécaniques sur la chaleur* (1792); *Du calorique rayonnant* (1809); and *Traités de physique mécanique* (1818).

PRÉVOST D'EXILES, Antoine François, popularly known as Abbé Prévost, a French author, born at Hesdin, near Montreuil, April 1, 1697, died near Chantilly, Nov. 23, 1763. He was educated for the church, but repeatedly escaped from convents to join the army, and was finally brought back to monastic life by disappointment in love. In 1720 he was ordained. While an inmate for several years of the abbey of St. Germain des Prés he began to write his first novel. In 1727, after vainly endeavoring to gain admission to the less rigorous monastery of Cluny, he escaped from the consequences of his unauthorized departure from the abbey by going to Holland, and in 1733 to England. The patronage of the prince of Conti enabled him in 1734 to return to France, and he became his chaplain. The last year of his life was passed in seclusion. He translated Cicero's "Familiar Letters," Middleton's "Life of Cicero," Hume's "History of the House of Stuart," and the principal novels of Richardson. His most elaborate work is the 17 volumes of his *Histoire générale des voyages*, subsequently extended by other authors, including La Harpe. The most celebrated of his numerous works is his semi-autobiographic *Manon Lescaut*, originally printed in 1733 under the title of *Histoire du chevalier Desgrieux et de Manon Lescaut* (last ed., 1875). His complete works comprise nearly 200 volumes. His *Œuvres choisies* have been published together with those of Le Sage (54 vols., Paris, 1783–'4, and 55 vols., 1810–'16).

PRÉVOST-PARADOL, Lucien Anatole, a French author, born in Paris, Aug. 8, 1829, died by his own hand in Washington, D. C., July 19, 1870. His mother was a celebrated tragic actress. In 1855 he became professor of French literature at Aix, and afterward obtained celebrity as a journalist in Paris. In 1863 and 1869 he was an unsuccessful candidate for the corps législatif; in 1865 he was elected to the academy over Jules Janin. In the summer of 1870 Napoleon III., whom he had previously opposed, appointed him minister to Washington. The cause of his suicide has been ascribed to his brain being affected by excessive heat, and to excitement at the outbreak of the Franco-German war. His principal works are: *Revue de l'histoire universelle* (1854; new ed., 2 vols., 1865); *Du rôle de la famille dans l'éducation*, crowned by the academy of moral sciences (1857); *Essais de politique et de littérature* (3 vols. 8vo, 1859–'63); *Quelques pages d'histoire contemporaine* (4 vols. 12mo, 1862–'6); and *La France nouvelle* (1868).

PRIAM, in Greek legends, the last king of Troy, son of Laomedon. In his youth he was taken prisoner by Hercules. He had previously been called Podarces, the swift-footed; but he was now bought from Hercules by his sister Hesione, and was thence called Priamus, or the ransomed. According to Homer, he had 50 sons, Hecuba alone having borne him 19; among them were Paris, Helenus, Deiphobus, and Hector, whom he loved best, and whose corpse he succeeded in ransoming from Achilles. Among his daughters, who according to some also numbered 50, were Polyxena, Cassandra, and Creüsa. Before the Trojan war he made an expedition against the Phrygians in aid of the Amazons. At the beginning of that war he was already too old to participate in the combats, and he appears only once on the field of battle, to settle the terms of the single combat between Paris and Menelaus. According to a later legend, he was slain at the sack of Troy by Neoptolemus, son of Achilles.

PRIAPUS, in Greek and Roman mythology, a type of fecundity, both in plants and animals, variously represented as the son of Bacchus and Venus, of Bacchus and a naiad, of Adonis and Venus, of Mercury, or of Pan. Homer and Hesiod do not mention him, and Strabo says that he was worshipped only in later times, and more especially at Lampsacus, which one tradition names as his birthplace. He was generally represented in the form of *hermæ*, that is, by a head placed on a quadrangular pillar, and painted red. His emblem was the phallus, and bearing this his image was placed in gardens and vineyards.

PRICE, Bartholomew, an English mathematician, born at Coln St. Dennis, Gloucestershire, in 1818. He is the son of a clergyman, and graduated in 1840 at Pembroke college, Oxford, of which he was elected fellow. He became tutor there and examiner in mathematical and physical science, and in 1853 professor of natural philosophy, which chair he still holds (1875). His principal work is a "Treatise on the Infinitesimal Calculus" (4 vols., Oxford, 1857–'62).

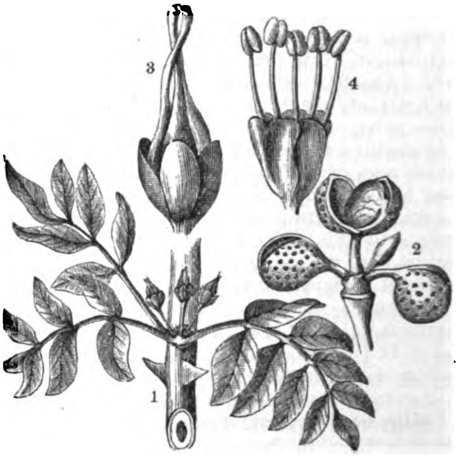
PRICE, Richard, a British author, born at Tynton, Glamorganshire, Feb. 23, 1723, died in London, March 19, 1791. He was the son of a dissenting Calvinistic minister, and studied at a dissenting academy. In 1743 he became a domestic chaplain at Stoke-Newington, in which office he remained 13 years. The death of his uncle left him a small fortune, and he married in 1757, and the next year became morning preacher in Newington Green chapel. He was afterward appointed pastor of the Gravelpit meeting, Hackney, and afternoon preacher at Newington Green, both of which offices he held till a short time before his death. His "Review of the Principal Questions and Difficulties in Morals" (1758) is an attempt to found moral obligation on intellectual instead of sentimental tests. In 1769 he published a treatise on reversionary payments, which resulted in their dissolution or modification; the seventh edition appeared in 1812. His "Appeal on the Subject of the National Debt" (1772) is said to have been the foundation of Pitt's sinking fund scheme. Of his "Observations on Civil Liberty and the Justice and Policy of the War with America" (1776) 60,000 copies were soon distributed. For this work he received the thanks of the corporation of London and the freedom of the city, and in 1778 the American congress invited him to become a citizen of the United States, and to aid them in managing their finances, promising him a liberal remuneration if he should remove to America. In 1783 he received the degree of LL. D. from Yale college. He wrote various other works on religion, ethics, politics, and finance. His biography was written by his nephew William Morgan, D. D. (London, 1815).

PRICE, Thomas, a Welsh scholar, born at Pencaerelin, Brecknockshire, Oct. 2, 1787, died at Cwmdu, Nov. 7, 1848. He was curate of various parishes from 1812 to 1825, when he was appointed vicar of Cwmdu. He was an accomplished harpist and draughtsman. His principal work in Welsh is the "History of Wales and the Welsh Nation from the Early Ages to the Death of Llewelyn ap Gruffydd," when Wales was annexed to England (1836–'42). He was an enthusiastic promoter of the eisteddfods and of Welsh literature. He also wrote "Geographical Progress of Empire and Civilization" (Llandovery, 1847–'8). His minor writings are collected in vol. i. of the "Literary Remains of the Rev. Thomas Price, with a Memoir," by Jane Williams (2 vols., Llandovery, 1854–'5), viz.: "Tour through Brittany;" an "Essay on the Comparative Merits of the Remains of Ancient Literature in the Welsh, Irish, and Gaelic Languages;" "An Essay on the Influence which the Welsh Traditions have had on the Literature of Europe;" and "A Critical Essay on the Language and Literature of Wales from the Time of Gruffydd ap Cynand and Meilyr in the 11th Century to that of Sir Gruffydd Llwyd and Gwilyn Ddu in the 14th Century."

PRICE, Sir Uvedale, an English author, born at Foxley, Herefordshire, in 1747, died there, Sept. 11, 1829. He was educated at Oxford, and in 1780 appeared as the translator of Pausanias, in "An Account of the Statues, Pictures, and Temples in Greece." His fame rests upon his "Essay on the Picturesque, as compared with the Sublime and Beautiful, and on the Use of Studying Pictures for the purpose of improving Real Landscapes" (1794). In 1828 he was made a baronet.

PRICHARD, James Cowles, an English ethnologist, born at Ross, Herefordshire, Feb. 11, 1786, died in London, Dec. 22, 1848. He graduated M. D. at Edinburgh, settled as a physician in Bristol in 1810, and in 1813 published "Researches into the Physical History of Man," which was translated into French and German, and in 1826 a second and greatly enlarged edition. In 1845 he was appointed commissioner of lunacy, and removed to London, where he brought out the third edition of the "Researches" (5 vols. 8vo., 1841–'7). He is also the author of a *résumé* of his "Physical History," "Natural History of Man" (2 vols., 1843; new ed. by E. Norris, 1855), and "The Eastern Origin of the Celtic Nations" (1831; new ed. by R. G. Latham, 1857).

PRICKLY ASH, one of the common names for *xanthoxylum Americanum* (Gr. *ξανθός*, yellow, and *ξυλόν*, wood), a shrub belonging to the rue family (*rutaceæ*), and quite common throughout the northern states; its prickly stems and pinnate leaves have given it the name by which it is best known, and it is also called toothache tree and yellow-wood, the last being a name applied to several quite distinct plants. It is a shrub 5 to 10 ft. high, with prickly stems and compound leaves having four or five pairs of leaflets and an odd one, marked by pellucid dots which contain an aromatic oil. The small, greenish, axillary flowers are diœcious, and appear before the leaves; they have four or five sepals and petals, and the sterile flowers the same number of stamens; the fertile flowers have two to five separate pistils, with their styles slightly united, ripening into fleshy two-valved pods with one or two seeds. All parts of the plant are pungent and aromatic, the leaves and fruit having a very strong lemon-like odor; the bark, which in the dried state is kept in the shops, has when chewed a sweet and aromatic taste, which soon becomes very acrid, and excites a copious flow of saliva. A peculiar principle called xanthopicrite is said to have been separated from it. It is an active stimulant, increasing the perspiration and other excretions, and a tincture of the bark and berries has long been a domestic remedy for chronic rheumatism; the scraped bark has been used as a stimulant application to indolent ulcers, and the bark is sometimes chewed to relieve toothache.—The southern prickly ash is *X. Carolinianum*, found on the coast from Virginia southward; it has very sharp prickles, shining leaves, and flowers in a terminal cyme. Its properties are quite similar to the preceding. Other species are found in Florida and the West Indies, which have much the same taste and smell. The stems of *X. clava Herculis*, one of the several trees, called Hercules's club, have strong prickles, and are frequently brought from the West Indies as walking sticks. There are several oriental species, the berries of one of which are used for intoxicating fish.



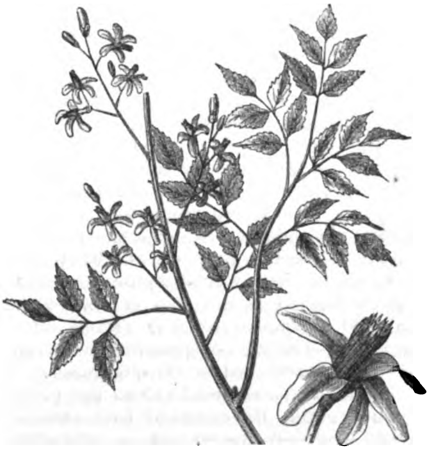
Prickly Ash (Xanthoxylum Americanum).

1. Pistillate flowers and leaves of the natural size at flowering time. 2. Fruit of natural size. 3. Pistillate flower enlarged. 4. Staminate flower enlarged.

PRICKLY PEAR. See Cactus.

PRIDEAUX, Humphrey, an English clergyman, born at Padstow, Cornwall, May 3, 1648, died in Norwich, Nov. 1, 1724. He graduated B. A. at Christ Church, Oxford, in 1672. Appointed by the university to edit the inscriptions of the Arundelian marbles, he published them in 1676, under the title *Marmora Oxoniensia, ex Arundelianis, Seldenianis, aliisque conflata, cum perpetuo Commentario;* a correct edition by Michael Maittaire appeared in 1732. In 1679 he became rector of St. Clement's, Oxford, and was appointed Dr. Busby's Hebrew lecturer in Christ Church. In 1681 he was made a prebendary of Norwich, in 1688 archdeacon of Suffolk, in 1696 vicar of Trowse, near Norwich, and in 1702 dean of Norwich. He was the author of "The Validity of the Orders of the Church of England made out against the Objections of the Papists" (1688); "Case of Clandestine Marriage" (1691); "Life of Mahomet" (1697); "Directions to Church Wardens" (1707); a work on "Tithes" (1710); and "The Connection of the History of the Old and New Testaments" (2 vols., 1715–'18; 25th ed., 1858), his chief work.

PRIDE OF INDIA, Pride of China, or **Bead Tree** (*melia azedarach*), an oriental tree, now naturalized in most warm countries. The genus *melia* (from the Greek name for the manna ash, which its foliage somewhat resembles) is the type of a somewhat large and important family (*meliaceæ*) of the warmer parts of Asia and America; it consists of deciduous trees and shrubs with pinnate leaves, their flowers with the stamens united into a tube, a free, three- to five-celled ovary, with two ovules in each cell. The pride of India, a native of Asia, is a tree 20 to 40 ft. high, often with a trunk 3 ft. in diameter; its leaves are bipinnate, each division with five ovate-lanceolate, acute, toothed leaflets. The flowers are in large axillary bunches, with a small calyx, five spreading lilac-colored petals, and ten stamens, which, united into a tube, form a conspicuous part of the flower. The fruit is an ovoid fleshy berry, about the size of a cherry, containing an elongated, five-celled, five-seeded, bony nut. The tree is largely planted in the southern states, and has become thoroughly naturalized not only there, but in parts of the southwest so far from all settlements that some botanists have thought it must be indigenous. Its chief claim as an ornamental tree is its rapid growth, it making an ample shade in a short time after planting. It is quite handsome in flower, but the odor is somewhat unpleasant; it bears such an abundance of fruit that the branches are bent down by the weight. The bark of the root has long been used as a vermifuge; a strong decoction of it is made by boiling four ounces in a pint of water; from half an ounce to an ounce of the liquid is given every two hours, and followed by a cathartic. Very conflicting accounts are given of the effects of the berries; three of them are said to have thrown a child into convulsions, while other children eat them with impunity; they are said by some authorities to be destructive to swine, while some persons gather them to feed to their horses. It seems desirable that experiments should be made to establish the real value of this very common product in most of the southern states. It is said that the leaves or the berries if packed with dried fruits will preserve them from insects, and that they will also prevent moths from attacking clothing. The wood of the tree has a fine grain and a handsomely variegated surface; it is recommended for trunks and drawers, as insects do not attack it. The tree is not hardy north of Virginia.—*Melia Indica*, which is much planted in southern India, has been confounded with *M. azedarach*, from which it differs in its simply pinnate leaves and one-celled and one-seeded fruit. It is known in India as *margosa* (Port. *amargosa*, bitter), and the bark is there used by both natives and Europeans as a tonic and antiperiodic. Its fruit yields an oil used for burning.



Pride of India (Melia azedarach).

PRIESSNITZ, Vincenz, a German peasant, the founder of the water cure, born at Gräfenberg, Austrian Silesia, Oct. 4, 1799, died there, Nov. 28, 1851. He worked on his father's farm, and an accident which happened to him while he was thus engaged suggested the employment of water cure. He then studied medicine, and opened his establishment at Gräfenberg in 1826. (See Hydropathy.)

PRIEST, a person set apart for the performance of religious offices and ceremonies, and in particular for the performance of sacrifice. History shows the priestly office to be nearly coextensive with religion itself, and there is hardly a barbarous tribe without some sort of priests. There is but little information concerning the exercise of priestly functions before the time of Moses. We read in the Scriptures of Cain and Abel offering their own sacrifices, and of the exercise of the priestly office by the heads of families, as Abraham, or Job. The term priest occurs but once in the book of Genesis, when Melchizedek is called a priest of the Most High. The Mosaic law established a special priesthood consisting of three orders, the high priests, the priests, and the Levites, all of them from the tribe of Levi. The priesthood was hereditary in the family of Aaron; and the first born of the oldest branch of that family, if he had no legal blemish, was the high priest. This was observed till the Jews fell under the dominion of the Syrian Greeks; then and afterward under the Romans the high priesthood was sometimes put up to sale, and became a temporary office. In the time of David the inferior priests were divided into 24 companies, each company serving in rotation for a week.—The early history of the priesthood of the several pagan religions is involved in obscurity, though elucidated in many important details by modern criticism. With most of the uncivilized tribes the priest had a very limited sphere of action; he generally appears as a sorcerer, who derives by communication with a spirit world the command of magic powers for the relief of the distressed and suffering. With some tribes this power was the only attribute of the priesthood; with others they had the office of divining, and of offering sacrifices. In the Society islands and New Zealand the priesthood formed a hereditary corporation; but nowhere among pagan tribes have they been so powerful as in Mexico, where they are said to have numbered 4,000,000 on the arrival of the Spaniards.—The idea of priesthood was much more fully developed by Brahmanism. The Brahmans have assigned to them the primacy of honor among the castes of India, and it is easy to trace in the enormous prerogatives with which they are clothed the fundamental idea of a vicegerency of God upon earth. Brahmans are also charged with preserving the soundness of doctrine, and with presiding over sacrifices and divine services.—The state church of China, which owes its organization to Confucius, has no special priesthood, but the priestly functions are blended with those of the emperor and the state officers. The Buddhist priests, called lamas in Mongolia and Thibet, bonzes in Japan, rahans in Burmah, talapoins in Siam, and gunnis in Ceylon, are essentially spiritual guides. They are to be examples of a perfect life, consisting, according to Buddhist views, in overcoming matter, accumulating merits, and thus preparing for a higher second birth. They do not form a caste; they live in celibacy, and the chief of the central Asian Buddhists, the dalai lama, is regarded as the incarnation of Buddha himself. (See LAMAISM.) The magi of the Persians were the conductors of religious services and the teachers of the people. In Egypt the priests likewise formed one of the supreme castes, endowed with many privileges, and exempt from taxation. They were divided into several classes, and constituted a complete hierarchy, on a democratic basis, with a chief priest at their head. More than any other pagan priesthood, they gained their preëminence and secured the continuance of their prerogatives by their literary superiority. The ancient religion of the Greeks had no general priesthood, but only priests of the several deities, who slaughtered the victims, and often secured a powerful influence as the interpreters of the will of the deity. Finally the priestly office among them fell into utter insignificance. The Roman priesthood was to a larger extent than that of any other great nation of antiquity charged with the office of divining. It was a well organized and largely privileged state institution, which retained its social position and political influence when the belief in its faculty of divining had entirely ceased among the educated classes, and when Cicero, as he says, wondered how two augurs could meet without laughing at each other.—In the Christian system the gospel represents Christ as the one priest, who, for the redemption of the world, offered the one sacrifice, that of the cross. So far all who receive the record of the gospel as infallibly true agree; but there is a fundamental difference of opinion on the question, whether this sole priesthood of Christ is incompatible with the existence of a proper priestly office in the church. The Roman Catholic church, and those eastern churches (Greek, Armenian, Nestorian, Jacobite, Coptic, Abyssinian) which regard ordination as a sacrament, maintain that the sacrifice of the cross was to be continued and kept perpetually present in the church through appointed representatives and vicegerents of Christ, who for that purpose continue and partake in the priestly character of Christ and his mediatorial office between God and man. (See ORDINATION.) The other Christian denominations deny that there is in the Christian church any other real priest than Christ, since there is no one after Christ who has the power of offering sacrifices for the people. But they believe in a spiritual priesthood of all Christians, which they derive from their union with Christ, the sole high priest. They therefore do not regard the clergy as an order specifically distinct from the laity, but only as the body of teachers and servants of the church, who, being divinely called and properly appointed, possess certain ecclesiastical rights and undertake certain duties, which they derive partly from divine, partly from human law. (See CLERGY.) The Protestant Episcopal churches of England, Scotland, Ireland, and America have retained the word priest, to denote the second order of their hierarchy.

PRIESTLEY, Joseph, an English philosopher, born at Fieldhead, Yorkshire, March 13, 1733, died in Northumberland, Pa., Feb. 6, 1804. He was the son of a cloth dresser, and was instructed in the classics in a free grammar school. He learned Hebrew in his holidays under a dissenting minister, and with little instruction made progress in the Chaldaic, Syriac, Arabic, French, Italian, and German. At the age of 19 he entered the dissenting academy at Daventry (now incorporated with New college, London) as a theological student. He had become an Arminian before leaving home, and on account of his doubts concerning orthodoxy had not been admitted a communicant of the Calvinistic church. While at the academy he composed the first part of his "Institutes of Natural and Revealed Religion" (3 vols., 1772–'4). In 1755 he became assistant minister to the Independent congregation in Needham Market, Suffolk, where he remained three years, suspected of heresy and not popular either as a preacher or teacher. He there renounced the doctrine of the atonement, and wrote his "Scripture Doctrine of Remission," published in 1761. In 1758 he opened a day school at Nantwich, Cheshire, and with a limited apparatus, including an air pump and electrical machine, began his researches in natural philosophy. In 1761 he became professor of belles-lettres in Warrington academy. While there he wrote "Theory of Language and Universal Grammar" (1762), "Chart of Biography" (1765), "Essay on a Course of Liberal Education for Civil and Active Life" (1765), and "History and Present State of Electricity, with Original Experiments" (1767), for which Dr. Franklin, to whom Priestley had been introduced in London, furnished the requisite books. About this time he was elected to the royal society, and received the degree of LL. D. from the university of Edinburgh. In 1768 he was chosen pastor of a large congregation in Leeds, where he devoted much of his attention to theological subjects. In 1769 he published his "Chart of History." In 1772 appeared his "History and Present State of Discoveries relating to Vision, Light, and Colors," "Laws and Constitution of England," and a pamphlet on "Impregnated Water with Fixed Air." In 1773 he received from the royal society the Copley medal for "Observations on the Different Kinds of Air." He discovered oxygen gas, which he named dephlogisticated air; showed that the red color of the arterial blood is due to its combination with oxygen from the atmosphere; proved the abstraction of oxygen from the atmosphere in the processes of combustion and putrefaction; and recognized the property of vegetables to restore this constituent. He adhered to the phlogistic theory after Lavoisier had overthrown it. He discovered also nitrous oxide gas, carbonic oxide gas, sulphurous oxide gas, ammoniacal gas, which he called alkaline air, and hydrochloric acid gas; and he was the principal inventor of the pneumatic trough. From 1773 to 1780 he was librarian and literary companion to the earl of Shelburne, accompanying him in 1774 on a journey to the continent. He continued his chemical experiments, making discoveries concerning aëriform bodies, which he reported in his "Experiments and Observations on Air" (5 vols., 1774–'80). He published in 1775 his "Examination" of Drs. Reid, Beattie, and Oswald, designed to refute the Scotch philosophy of common sense; in 1777, his "Disquisitions relating to Matter and Spirit," a defence of avowed materialism, "Doctrine of Necessity," of which also he became the champion, and "Oratory and Criticism." In 1780 his connection with Lord Shelburne was dissolved; he retired with a pension for life of £150, and became pastor of a dissenting congregation at Birmingham. At the same time a subscription was raised by his friends to defray the expenses of his experiments. In 1780 he published "Letters to a Philosophical Unbeliever," and in 1781 "State of the Evidence of Revealed Religion." In 1782 appeared his "History of the Corruptions of Christianity," which was burned by the common hangman in the city of Dort, and a refutation of which was one of the subjects of the Hague prize essays; and in 1786 his "History of Early Opinions concerning Jesus Christ." In each of these works the divinity and preëxistence of Christ are controverted on historical grounds. During the French revolution he was regarded as the mover and champion of antagonism to all establishments, political and religious. His attachment to freedom he had evinced by several pamphlets and by his interest in the cause of America during the war of the revolution. He exasperated the populace by his "Familiar Letters to the Inhabitants of Birmingham" (1790), by advocating the claims of dissenters, and by answering Burke's "Reflections" (1791), on account of which he was nominated a citizen of the French republic. In 1791 some of his friends celebrated the anniversary of the capture of the Bastile; and though he was not present, the event was the occasion of a riot in which his house was broken open, his library, apparatus, and manuscripts destroyed, and himself obliged to flee with his family. His books were strewn over the high road for half a mile; the scraps of the manuscripts covered the floors; and an attempt was made to set the house on fire. He received ample remuneration from the county and from private benevolence, and removed to Hackney to succeed Dr. Price; but noticing that his society was avoided even by his philosophical associates, he emigrated to America, arriving in New York June 4, 1794, and went to reside on his son's farm in Northumberland, Pa. He delivered two courses of public lectures in Philadelphia in 1796 and 1797 on the "Evidences of Revelation." He wrote and published in America his "Continuation of the History of the Christian Church from the Fall of the Western Empire to the Present Times" (4 vols., Northampton, 1803), and also several minor theological works, among which were answers to Volney's and Paine's attacks on revelation. His "Doctrines of Heathen Philosophy compared with those of Revelation" appeared posthumously. His autobiography to March, 1795, continued by his son, was also published in America posthumously, and in London (2 vols. 8vo, 1806–'7), and is contained with his correspondence in the edition of his "Theological and Miscellaneous Works" published by John Towell Rutt (25 vols., Hackney, 1817 *et seq.*). The centennial of the discovery of oxygen was celebrated by American chemists at Northumberland, Pa., Aug. 1, 1874, and on the same day a statue of Priestley was unveiled in Birmingham, England. A statue of him had been placed in the museum of Oxford university in 1860. A bibliography of his productions, prepared in the library of congress for the centennial celebration of 1876, comprises more than 300 published books and pamphlets on chemistry, history, theology, metaphysics, physics, politics, and miscellaneous subjects.

PRIESTS OF THE MISSION. See Lazarists.

PRIESTS OF THE ORATORY. See Oratorians.

PRIM, Juan, count of Reus and marquis de los Castillejos, a Spanish general, born in Reus, Catalonia, Dec. 6, 1814, died in Madrid, Dec. 30, 1870. He early entered the army and the cortes, and in 1843 aided Narvaez in overthrowing Espartero, for which he was made a count, a general, and governor of Madrid. In the following year he turned against Narvaez, who caused him to be sentenced to six years' imprisonment; but the queen soon pardoned him and appointed him governor of Porto Rico. From 1848 to 1853 he was a parliamentary leader of the progresistas, and subsequently he lived in exile till 1858. In 1859–'60 he gained decisive victories as commander of the Spanish army in Morocco, especially at the battle of Los Castillejos, from which he took his title of marquis. In 1862 he commanded the Spanish force in Mexico destined to coöperate with France and England; but, unwilling to abet the designs of the emperor Napoleon, he withdrew together with the English, and his course was approved by the cortes. In August, 1864, he was for a short time expelled from Madrid on account of his alleged complicity in a military conspiracy; and in January, 1866, after his abortive rebellion against O'Donnell's administration, he fled, and fomented disturbances at home even while abroad. In September, 1868, he brought about, with Serrano, Topete, and others, the revolution which drove Isabella from the throne, and became president of the council, minister of war, and commander-in-chief, with the rank of marshal, under Serrano's regency. After several vain attempts to find a foreign prince eligible for the throne, Prim fixed at last (July 2, 1870) upon Prince Leopold of Hohenzollern, which, through the jealousy of Napoleon III., resulted in the Franco-German war. He then prevailed upon the Italian prince Amadeus to become king, but was wounded by assassins on Dec. 28, and died on the same day on which Amadeus landed in Spain. A monument in his honor, cast in Paris, from drawings furnished by Zuloaga, a Spanish artist residing in France, was completed in 1875, to be placed over his tomb in the Atocha church at Madrid.

PRIMATE (Lat. *primas*, one first in rank), a hierarchical title generally given to archbishops, and sometimes to bishops, and denoting jurisdiction or precedence over the episcopal body of a whole country. The title belongs to the Latin church, and corresponds with that of exarch (ἔξαρχος) in the Greek church. The name first occurs in connection with the see of Carthage, whose bishop, as being the metropolitan of the African province, probably first bore the title of *primas*. When Constantine divided Africa into six provinces, the title of primate ceased to designate metropolitan rank, and attached only to seniority. In the countries of western Europe, outside of Italy, the use of this title for many centuries was regulated by no fixed rule. The first rank, *primatus*, was conceded universally to the Roman bishop. In the earliest times the bishops only who filled the office of papal legates were called primates; such were in Spain the bishops of Seville and Tarragona, and in Gaul the bishops of Arles and Vienne. In the 8th century Pope Zachary bestowed the title of primate upon the bishop of Mentz; and Beda says that in his time it was enjoyed by the bishops of London and Canterbury. It was conferred on the bishop of Pisa by Pope Alexander III. (died in 1181). In the English church before the reformation Canterbury held primatial rank, and it has retained the rank as a Protestant see. In Ireland Armagh, as being the see of St. Patrick, held primatial rank, its archbishop styling himself in later times "primate of all Ireland," while the archbishop of Dublin claims to be "primate of Ireland." Such is even now the style assumed by both the Protestant and Roman Catholic occupants of these sees. On the continent primatial rank and jurisdiction varied with the political limitations of each country. In France, before the concordat of 1801, seven archbishops received the title of primate, viz.: those of Rheims, Lyons, Sens, Bourges, Bordeaux, Arles, and Vienne, besides the bishop of Nancy, who styled himself primate of Lorraine; the archbishop of Lyons, as being the successor of St. Irenæus, took the title of "primate of primates." In Germany the primatial sees are Mentz and Treves, besides Gnesen for all Poland; in Sweden, Lund; in Bohemia, Prague; in Hungary, Gran; and in German Austria, Salzburg. Since the beginning of the present century the policy of the court of Rome has been to grant to no bishop, who was not already canonically entitled to it, the title and rights of primate.

PRIMATICCIO, Francesco, an Italian painter, born in Bologna in 1490, died in Paris in 1570. He completed his studies in Mantua under Giulio Romano, whom he assisted in important works, and in 1531 went to Paris, where he was employed by Francis I. and his successors as a painter, and also as a sculptor and architect. His frescoes of "The Gods of Homer" and "The Adventures of Ulysses" were destroyed in 1728, and only those of "Alexander the Great" remain at Fontainebleau.

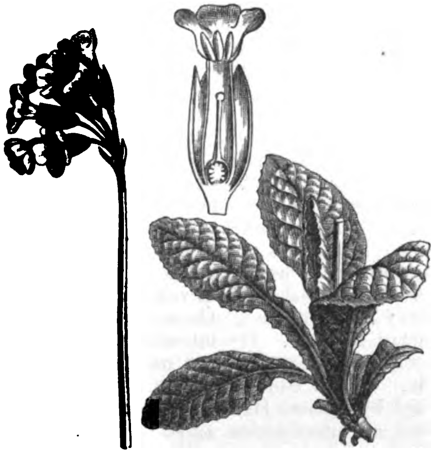
PRIME. I. Samuel Irenæus, an American clergyman, born at Ballston, N. Y., Nov. 4, 1812. He graduated at Williams college, Mass., in 1829, studied theology at Princeton, and entered the ministry of the Presbyterian church. He preached for one year in his native town, and for three years in a parish on the Hudson, opposite Newburgh. Since 1840 he has been editor of the "New York Observer." His contributions under the signature "Irenæus" have had much popularity, and the "Observer" has become one of the leading periodicals in the country. He has several times visited Europe, and has published sketches of his travels under the titles "Travels in Europe and the East" (2 vols., New York, 1855), "Letters from Switzerland" (1860), and "The Alhambra and the Kremlin" (1873). He has also published "The Old White Meeting House, or Reminiscences of a Country Congregation" (1845); "Life in New York" (1845); "Annals of the English Bible," an abridgment and continuation of the work of Anderson (1849); "Thoughts on the Death of Little Children" (1850); "The Power of Prayer," a sketch of the Fulton street prayer meeting (1859; translated into several languages), followed by a volume entitled "Five Years of Prayer" (1864), and another entitled "Fifteen Years of Prayer" (1872); "The Bible in the Levant" (1859); "Memoirs of Rev. Nicholas Murray" (1862); "Under the Trees," and "Life of S. F. B. Morse" (1874). He has received the degree of D. D. from Hampden Sidney college, Va. **II. Edward Dorr Griffin**, an American journalist, brother of the preceding, born at Cambridge, N. Y., Nov. 2, 1814. He graduated at Union college in 1832, and at Princeton seminary in 1838, and was pastor of a Presbyterian church at Scotchtown, N. Y., from 1839 to 1851. He became associate editor of the "New York Observer" in 1853, was foreign correspondent of the same and chaplain at Rome in 1854–'5, resumed his editorship in 1855, and became one of the proprietors in 1865. In 1869–'70 he visited California, Japan, China, India, Egypt, and the Holy Land, and on his return published "Around the World: Sketches of Travel through many Lands and over many Seas." He has also written "Forty Years in the Turkish Empire, or Memoirs of Rev. William Goodell, D. D., Missionary of the A. B. C. F. M." (1875). **III. William Cowper**, an American author, brother of the preceding, born at Cambridge, N. Y., Oct. 31, 1825. He graduated at Princeton college, N. J., in 1843, and became a member of the bar in the city of New York, where he practised his profession till 1861, when he became a proprietor of the New York "Journal of Commerce" newspaper, of which he was for some years editor. Among his miscellaneous publications are: "The Owl Creek Letters" (1848), consisting of papers originally contributed to the "Journal of Commerce;" "The Old House by the River" (1853); and "Later Years" (1854). In 1855–'6 he travelled extensively in the East and elsewhere, and published "Boat Life in Egypt and Nubia" (1857), and "Tent Life in the Holy Land" (1857). He has since published "Coins, Medals, and Seals" (4to, 1861); "O Mother, Dear Jerusalem! the old Hymn, its History and Genealogy" (1865); and "I go a-Fishing" (1873). He has edited with an introduction a facsimile of Albert Dürer's *Die Kleine Passion* (4to, 1868).

PRIMOGENITURE, a rule of law which confers a dignity or estate in lands on a person in virtue of his being the eldest male of those who could inherit. A preference of sons to daughters was common to many of the ancient systems of law; but few or none of them recognized what in our time is meant by primogeniture. Among the Hebrews, the first born son as such received a double portion in his father's estate. If a Greek father died intestate leaving daughters only, his property went to his nearest kinsman. His will, if in such a case he made one, passed his estate not to his daughters, but to their future husbands. The earlier Roman law excluded daughters from the inheritance. Justinian first admitted them to share equally with their brothers. The Mohammedan law makes daughters heirs, but allows a twofold share to sons. The states of Europe which, after the decline of the Roman empire, made the later Roman law the basis of their jurisprudence, did not find in that code the doctrine of primogeniture. In France, it was not until the Capets came to the throne that even the prerogative of succession to the crown was reserved exclusively to the first born. The lords promptly imitated the kings, and secured their fiefs to their eldest sons, and thus founded in France the *droit d'aînesse*. Whatever may have been in any country the immediate origin of primogeniture, the custom was no doubt everywhere the peculiar policy of the feudal system. To make certain and efficient the render of military service, which was at once the cause and consideration of the grant of feuds (or fees), it was expedient to render these indivisible. The fittest successor to the original holder, as being the one first capable of doing military duty, was the eldest son; and to him accordingly the feudal law quite invariably transmitted the father's lands.—It is possible, perhaps probable, that in England, before the Norman conquest, the custom still prevalent in Kent, known as gavelkind, extended over the whole island. In virtue of this custom, the lands of one who died intestate, leaving sons and daughters, descend in equal divisions to the sons, exclusive of the daughters; but if he leave no sons, then the daughters share alike. But whatever be the truth in respect to this matter, certainly the conquest introduced the policy and rules of the continental feudal system, and thus prepared the way for the general adoption of the custom of primogeniture; so that eldest sons acquired the right of succession, primarily, to the lands held in fee, and consequently to the titles of dignity which were appurtenant to them. The canon of the common law touching descents which pertains to this subject is, that if a man dies seized of real estate of which he had the absolute ownership, without having made any disposition of it by his last will, the whole descends to his heir at law; and this heir at law is that one of his representatives who is the eldest male among those who are in the same degree of kindred. On this rule rests the English custom, and, as Gibbon calls it, the "insolent prerogative" of primogeniture. But large landed estates are perpetuated in families in England far less by this custom of primogeniture (which does not interfere with the owner's legal capacity of testamentary disposal) than by the system of settlements and entails, which rests on principles quite distinct from the former. The English law once allowed land to be entailed interminably, but this power has been gradually reduced, until now the longest settlement can extend only 21 years beyond lives in being when it is made, and the preference of the eldest son, though universal, is in this case altogether voluntary, as in that of a will. Yet the entail very rarely expires with the original limitation, as the first heir on coming of age may join with the existing possessor in resettling the estate and so prolonging the entail. In case of personal property, the right of primogeniture does not exist. In France primogeniture was abolished in 1789, and since that period the tendency of legislation in all countries except the British islands has been to its abolition. In Portugal, where the custom of primogeniture most extensively prevailed, the younger sons of the great families, too proud to work, not rarely lived on alms. In France they crowded into the church and the army, or led a life of complete and often destitute idleness.

PRIMORSK, or **Littoral Province,** the easternmost division of Siberia, established in 1858, and extending between lat. 42° 20′ and 70° N., and lon. 131° E. and 170° W.; area, 781,942 sq. m.; pop. in 1867, 43,320. It is bounded by the Polar sea, Behring strait, Behring sea, the Pacific ocean, the sea of Okhotsk, the sea of Japan, Corea, Mantchooria, the Amoor province, and Yakutsk, and is divided into the circles of Petropavlovsk (Kamtchatka), Gizhiginsk, Okhotsk, Udsk, Nikolayevsk, Sofiisk, and Usuri. The Stanovoi and Bureya mountain ranges form almost the entire N. W. and W. boundary. The Amoor in the southwest and the Anadyr in the northeast are the principal rivers. The island of Saghalien and the Russian Kuriles form part of the province. The inhabitants include Kamtchadales, Tchuktchis, Koriaks, Ainos, Russians, Mantchoos, and Japanese. Nikolayevsk, opposite the N. extremity of Saghalien, is the capital. (See SIBERIA.)

PRIMROSE, the name of a plant which in old English and French was written *primerole*, from the Italian *primaverola*, the diminutive of *primavera*, spring, which according to Pryor originally belonged to the daisy, but has been in some unaccountable manner transferred to *primula veris*. The genus *primula* (Lat., diminutive of *primus*, first) gives its name to a rather large and ornamental family, the *primulaceæ*, which is very frequent in alpine regions; it is distinguished from other monopetalous families with regular flowers by having the stamens opposite to, and not alternate with, the lobes of the corolla; they are herbs with radical or opposite or whorled leaves, four or five corolla lobes and stamens, and a one-celled, many-seeded capsule. In *primula* the leaves are all radical; the solitary or umbellate flowers on radical stalks; the corolla with a straight tube, and a five-lobed, spreading limb, the divisions of which are often notched or two-cleft. There are two native species of primrose found along the northern borders of the eastern states, both somewhat rare. The bird's-eye primrose (*P. farinosa*), also a native of Europe, has the under side of its obovate lanceolate leaves, upper part of flower stem, and calyx covered with a white mealiness; the flower stalk 6 to 10 in. high, bearing several (sometimes 20) handsome, pale lilac flowers, with a yellow eye. The Mistassinnie primrose (*P. Mistassinica*), so called by Michaux because he first found it near a Canadian lake of that name, occurs from Maine to northern New York and westward to Michigan and Wisconsin, along the shores of lakes; it is a very pretty little species, its veiny leaves not mealy, and having from one to eight flesh-colored flowers, upon a stem 2 to 6 in. high. Several other species are found on the mountains of the far west, one of which, first discovered on Pike's peak by Dr. C. C. Parry (*P. Parryi*), and since found on other Rocky mountain peaks, is one of the most beautiful of the genus, having very large flowers of the richest purple. Attempts to cultivate it have failed; in its native localities it blooms along alpine streams where its roots are bathed with ice-cold water from melting snows, a condition not readily imitated in cultivation.—The common primrose of England and northern Europe, the primrose of poetry, is a plant which has proved very puzzling to botanists; under the names of primrose, cowslip, and oxlip, three very distinct forms are popularly recognized, and some botanists accept these as three species, while others return to the views of Linnæus, who placed them as varieties of one species, *P. veris;* these varieties or species have by crossing produced several other forms, and in the confusion thus caused it will serve the present purpose to accept the popular classification. The common or true primrose (*P. veris*, var. *a*, *P. vulgaris*, and *P. acaulis* of different authors) has wrinkled and toothed leaves, which are hairy beneath; the umbel is nearly sessile, the scape or common flower stalk being very short and concealed by the bases of the leaves, so that the flowers appear as if solitary on radical pedicels as long as the leaves; the flower has a flat limb and is of a pale sulphur-yellow. This is the original of the cultivated polyanthus; it is so abundant in pastures and hedge banks in England as to be regarded as a weed. The cowslip (*P. veris*, var. *b*, and *P. officinalis*) has leaves with winged petioles, not hairy but often with a pale down, the flowers in an umbel which is raised upon a stalk above the leaves; flowers buff-yellow, varying in size, but smaller than in the primrose, and the limb concave or much cupped. It is found in similar situations with the preceding, and both ascend the mountains to the height of 1,600 ft. The flowers contain considerable honey, and are in some parts of England gathered in large quantities, when just opened, and fermented with water and sugar to make cowslip wine; the root was formerly used as an astringent, and the leaves are employed as a salad and a pot herb. The oxlip (*P. veris*, var. *c*, and *P. elatior*) has similar foliage to that of the cowslip, and the umbels are also on distinct stalks; it is intermediate between that and the primrose, from which last it differs in having its umbel raised above the leaves, and from the cowslip it mainly differs in its broader and flatter flowers. The names of both cowslip and oxlip are of very uncertain origin. These three are frequently found growing together with puzzling intermediate forms. Their flowers afford abundant examples of dimorphism; *i. e.*, in some the pistil reaches to the top of the tube of the corolla, the stigma showing like a globular knob at the throat, while the stamens, attached to the sides of the tube, are about half way down it; in other specimens the pistil is only half the length of the corolla, while the stamens are placed at its throat. This arrangement is one of the many to insure cross fertilization, as an insect visiting a long-styled flower in search of honey would have its proboscis dusted with pollen at a part which, when it visited a short-styled flower, would come just opposite the stigma, where some of the pollen would be deposited; and, *vice versa*, pollen from the short-styled flowers would be carried to fertilize those with long styles. Primroses, cowslips, and oxlips are much less frequently seen in our gardens than formerly, partly from their being displaced by more showy flowers, and partly from their uncertain hardiness. Though the natural color of the flowers is yellow, there are varieties ranging from white to purple, and also some double ones. The polyanthus, a variety of the primrose, ranks as a florist's flower; its colors are clear yellow and brown, with the divisions between the colors well marked, and there are double forms; it is safer to protect polyanthuses in a cold frame, but they often succeed in the open ground. All the foregoing are raised from seed, sown in early spring; the plants, if kept growing all summer, will be large enough to flower the next spring; after the flowers fade the plants may be divided into as many pieces as there are buds or crowns to the root. —The auricula, *primula auricula*, is another of those beautiful old flowers now neglected and almost forgotten; it is a native of the mountains of southern Europe, and difficult to raise in this country on account of the great extremes of heat and cold. In the manufacturing towns of England and Scotland the workmen cultivate it in great perfection, and have auricula shows at which the competition

Common Primrose (Primula veris).


Cowslip (Primula veris, var. b).

is very active. The thick, obovate leaves are in a radical cluster and mealy; the flower stalk, 6 or 8 in. high, bears six or eight flowers, which are fragrant and sometimes double; the colors are from white to dark brown, those being most esteemed which have a light-colored eye edged with some very dark color, and abundantly covered with a powdery bloom or mealiness.—*Primula cortusoides*, from Siberia, is a charming plant and hardy.. The new Japan primrose, *P. Japonica*, while it does not warrant the extravagant praises with which it was introduced a few years ago, is hardy near New York, and a desirable plant.—Among greenhouse species, the most prominent is the Chinese primrose, *P. Sinensis*, which has round-heart-shaped, several-lobed, downy leaves on long petioles, and umbels of large, showy flowers, which have an inflated calyx; there are numerous varieties, single and double, from white to purple, and one race with the lobes of the corolla beautifully cut-fringed. This is one of the most popular of greenhouse plants, and well suited to window culture; it is easily raised from seeds, and slowly multiplied by cuttings. Large quantities of the double white are raised by florists for winter decorations.—American cowslip is *dodecatheon Meadia* (Gr. *δώδεκα*, twelve, and *θεοί*, gods, one of Linnæus's fanciful names), of the same family. This is one of our most beautiful wild plants, and is often cultivated; it is found in rich woods from Pennsylvania to Wisconsin and southwestward. It is a smooth perennial with a cluster of oblong leaves, and a naked stem a foot or more high, bearing an umbel of pale purple flowers, each one of which droops in a graceful manner; the lobes of the corolla are long and narrow, and sharply reflexed like those of the cyclamen, which gives them an appearance that no doubt suggested the name "shooting star," which it frequently bears at the west. There are white and other varieties, all fine for the garden.

American Cowslip (Dodecatheon Meadia).

PRIMROSE, Evening. See Œnothera.

PRINCE (Lat. *princeps*), a title appertaining to a sovereign, to his male offspring, or to persons of eminent rank who do not possess the attributes of sovereignty. The word *princeps* was employed by the Romans to denote a senator of rank who held the office of *custos* of the city, and was adopted by Augustus and his successors in the imperial chair as a title of dignity. In England the title strictly belongs only to persons of the blood royal, who receive it by right of birth, and without a formal investment, as in the creation of dukes or other orders of nobility. The younger sons of the sovereign retain it until another title is conferred upon them, but the daughters remain princesses. A special exception is made in the case of the eldest son, who is created by patent prince of Wales. In France, under the old *régime*, the title was borne principally by persons of distinction connected with the blood royal. Napoleon I. conferred it upon several of his marshals and ministers. Germany formerly comprehended many petty states called principalities, governed by hereditary princes, most of whom at present have no territorial sovereignty. In Russia, where it was formerly borne by the sovereigns, and elsewhere in Europe, the title is the highest that can be conferred upon a subject.

PRINCE, the N. W. county of Prince Edward Island, Canada; area, 736 sq. m.; pop. in 1871, 28,302. It is traversed by the Prince Edward Island railroad. The land is undulating and fertile. Capital, Summerside.

PRINCE, Thomas, an American clergyman, born in Sandwich, Mass., May 15, 1687, died in Boston, Oct. 22, 1758. He graduated at Harvard college in 1707, and in 1711, after visiting Barbadoes and Madeira, settled as pastor at Combs, in Suffolk, England. About 1717 he returned to Massachusetts accompanied by several of his congregation, and on Oct. 1, 1718, became colleague of the Rev. Joseph Sewall at the Old South church in Boston, where he remained until his death. In 1736 appeared the first volume of his "Annals of New England," the second volume appearing in 1755. He intended to bring the history down to 1730, but only finished it to 1633. A new edition was published in 1826, edited by Nathan Hale. Mr. Prince also published an introduction and notes to Mason's "History of the Pequot War" (1736), notes and appendix to Williams's "Redeemed Captive" (1757), and a revision of the Psalms, with a historical preface and notes (1758).

PRINCE EDWARD, a S. county of Virginia, bordered N. by the Appomattox and S. by the Nottaway river, and drained by several small streams; area, about 350 sq. m.; pop. in 1870, 12,004, of whom 7,898 were colored. It has a diversified surface and a generally fertile soil, and contains mines of coal and copper. It is intersected by the Atlantic, Mississippi, and Ohio, and the Richmond, Danville, and Piedmont railroads. The chief productions in 1870 were 43,820 bushels of wheat, 87,440 of Indian corn, 67,445 of oats, 960,700 lbs. of tobacco, and 51,791 of butter. There were 692 horses, 519 mules and asses, 1,241 milch cows, 528 working oxen, 1,051 other cattle, 1,600 sheep, and 4,228 swine. Capital, Farmville.

PRINCE EDWARD, an E. county of Ontario, Canada, on the N. shore of Lake Ontario; area, 388 sq. m.; pop. in 1871, 20,336, of whom 6,649 were of English, 5,906 of Irish, 4,866 of German, 1,378 of Scotch, 697 of French, and 634 of Dutch origin or descent. It consists of a peninsula, separated from the mainland by the bay of Quinté. Capital, Picton.

PRINCE EDWARD ISLAND, a province of the Dominion of Canada, comprising the island of Prince Edward, lying in the gulf of St. Lawrence, between lat. 45° 58′ and 47° 7′ N., and lon. 62° and 64° 27′ W., separated from New Brunswick and Nova Scotia on the southwest by Northumberland strait, which varies in width from 9 to 30 m. The length from N. W. to S. E. is 105 m.; the breadth varies from not more than 2 m. to about 40 m.; area, 2,173 sq. m. It is divided into three counties: Prince in the northwest, Queen's in the centre, and King's in the east. Charlottetown in Queen's co. (pop. in 1871, 8,807) is the capital, chief commercial point, and only city. There are three towns: Summerside (pop. 1,918) and Princetown (417) in Prince co., and Georgetown (1,056) in King's co. The population of the province in 1797 was 4,500; in 1827, 23,266; in 1833, 32,292; in 1841, 47,034; in 1848, 62,599; in 1855, 71,496; in 1861, 80,857; in 1871, 94,021 (47,121 males and 46,900 females), including 323 Micmac Indians. Of the white population in 1871, 80,271 were natives of the province, 3,246 of other parts of British America, 4,128 of Scotland, 3,712 of Ireland, 1,957 of England, and 384 of other countries. There were 25,952 children between 5 and 16 years of age, 12,790 males from 21 to 45, 14,841 families, 64 blind persons, 70 deaf and dumb, and 188 insane. The natives of the province are chiefly descendants of the French Acadians who remained after the cession of the island to Great Britain; of settlers from the highlands of Scotland, introduced subsequently to 1770 by the proprietors of townships; and of American loyalists to whom lands were granted at the close of the revolutionary war. —The surface is generally flat, but rises here and there to a moderate height, without being anywhere too broken for agriculture. The coasts are bold, and are lined with red cliffs varying from 20 to 100 ft. in height, and deeply indented by bays, with numerous projecting headlands. The principal bays are Egmont, Halifax or Bedeque, and Hillsborough on the S. W. coast, Cardigan at the E. extremity of the island, Bedford opposite Hillsborough, and Richmond opposite Halifax. Bedford and Hillsborough, and Richmond and Halifax bays, being separated from each other merely by narrow isthmuses, divide the island into three peninsulas. The chief headlands are North point at the N. E., West point at the N. W., East point at the E., and Cape Bear at the S. E. extremity; Cape Aylesbury, at the S. E. entrance of Richmond bay; Cape Kildare, directly S. of North point; Cape Egmont, between Egmont and Halifax bays; Rice point, at the N. W. and Prim point at the S. E. entrance of Hillsborough bay. The prevailing geological formation is trias or new red sandstone. This is supposed to be underlaid throughout by carboniferous rocks, but the depth of the coal seams is probably too great for profitable working. Brown earthy limestones occur, and there are considerable deposits of peat suitable for fuel. No valuable minerals have been discovered. The soil, watered by numerous springs and streams, is remarkably fertile. It consists for the most part of a thin layer of decayed vegetable matter over a light bright red loam about a foot deep, below which is a stiff clay generally resting upon sandstone. With the exception of a few bogs and swamps, the whole island is cultivable. Fires, lumbering, and cultivation have made large inroads upon the original forest, which covered the entire island, but a considerable portion still remains. The principal trees are beech, birch, maple, poplar, spruce, fir, hemlock, larch, cedar, mountain ash, and wild cherry. The climate is salubrious, and is milder than that of the adjacent continent. The air is almost entirely free from fogs, which are prevalent along the shores of Nova Scotia and Cape Breton. The winters are long and cold; the summers are warm, but not oppressive. The mean temperature of the year 1870 at Charlottetown was 38·64°; of the warmest month (August), 63·42°; of the coldest month (February), 13·74°; maximum temperature, 88°; minimum, —21°; number of days on which rain or snow fell, 120; number of days of strong wind, 38; number of thunder storms, 8. The total precipitation of rain and melted snow during the year ending Aug. 31, 1873, was 41·88 inches.—Agriculture is the chief occupation of the people, but the cultivation is not of the most approved kind. The climate and soil are well suited to the production of the smaller grains, root crops, and hay, and for dairy purposes. The summer is not warm enough for Indian corn. The chief productions according to the census of 1871 were 269,392 bushels of wheat, 75,109 of buckwheat, 176,441 of barley, 3,120,576 of oats, 2,411 of Indian corn, 11,864 of grass seed, 3,375,726 of potatoes, 395,358 of turnips, 5,992 of other root crops, 68,349 tons of hay, 27,282 lbs. of flax, 981,939 of butter, and 155,524 of cheese; value of apples and other fruit raised, £3,141. There were 25,829 horses, 62,984 neat cattle, 147,364 sheep, and 52,514 hogs. The manufactures, which are limited and chiefly for home consumption, embrace coarse cloth ("homespun") worn generally by the inhabitants, brick, lime, grist mill, saw mill, and tannery products. Ship building is carried on to some extent. The adjacent waters, particularly on the N. E. coast, abound in fish, but the fisheries are mainly prosecuted by vessels from the United States. The value of fish taken by inhabitants of the island during the year ending June 30, 1874, was $288,863, chiefly mackerel, cod, lobsters, salmon, and herring. The value of goods entered for consumption from foreign countries during the same period was $1,918,696, of which $1,454,200 was from Great Britain and $394,803 from the United States. The chief articles of import are cottons, woollens, hardware, and other manufactured goods, tea, sugar, spirits, and flour. The value of exports to foreign countries during the same period was $722,129, viz.: agricultural products, chiefly oats, $419,426; products of the fisheries, $135,234; animals and their produce, chiefly eggs, $97,125; forest products, $51,118; miscellaneous articles, $19,226. The exports were distributed as follows: to Great Britain, $396,486; to the United States, $193,571; to Newfoundland, $84,299; to the British West Indies, $29,587; to St. Pierre, $9,063. The number of entrances was 172, tonnage 51,478; clearances 176, tonnage 49,101; built during the year, 67 vessels, with an aggregate tonnage of 15,024. The number of vessels belonging in the province at the close of 1873 was 280, with an aggregate tonnage of 38,918. A railroad, commenced by the colonial government and completed by the Dominion, traverses the entire length of the island, connecting Charlottetown with Tignish on the northwest and Georgetown and Souris on the southeast. The length of the W. division, from Charlottetown to Tignish, is 117 m.; of the E. division, from Charlottetown to Georgetown, 46 m.; of the branch from Mount Stewart (22 m. from Charlottetown) on the E. division to Souris, 38 m.; total, 201 m. The island is connected with the mainland by telegraphic cable. During the season of navigation a tri-weekly line of steamers runs from Charlottetown to Pictou, Nova Scotia, and to Shediac, New Brunswick, and weekly lines connect with Quebec and with Halifax and Boston. Navigation closes about the middle or end of December, and does not reopen until the end of April or the beginning of May. Ice forms in the harbor of Georgetown about a month later and breaks up about a month earlier than these dates. In winter mails and passengers are conveyed across the strait in ice boats, from Cape Traverse to Cape Tormentin, N. B., but the passage is attended with difficulty and danger. There are five banks (three at Charlottetown, one at Summerside, and one at Rustico), which in 1874 had an aggregate capital of $359,758 34, an outstanding circulation of $568,917 87, and resources to the amount of $1,814,671 90. The deposits in government savings banks, other than post-office savings banks, on May 31, 1874, amounted to $320,750 38.—The executive power of the province is vested in a lieutenant governor (appointed by the governor general of the Dominion in council), assisted by an executive council of nine members (president of the council, provincial secretary, attorney general, and six without office), who are appointed by himself and responsible to the legislature. The legislature consists of a legislative council of 13 members and a house of assembly of 30 members. There is a small property qualification for members of assembly, but none for councilmen. The right of suffrage is conferred upon all male British subjects 21 years old and upward, a property qualification being required of electors of councilmen and a smaller one of electors of assemblymen. Voting is *viva voce*. The principal judicial officers are a chief justice, an assistant judge and master of the rolls, and an assistant judge and vice chancellor, appointed by the governor general during good behavior. The supreme court is held by the three judges in cases of appeal, or by one of them in jury trials in the different counties; the court of chancery is held by the master of the rolls or vice chancellor. There is a probate court, with jurisdiction throughout the island, held by a single judge. The court of divorce consists of the lieutenant governor and members of the executive council. There are also inferior courts. The province is represented in the Dominion parliament by four senators and six members of the house of commons. The balance in the provincial treasury on Jan. 1, 1874, was $267,301 94; receipts during the following year, $406,347 81, including $268,644 27 subsidy from the Dominion government and $40,000 proceeds of debentures; total, $673,649 75. The expenditures during the year amounted to $443,915 94; balance in treasury on Dec. 31, 1874, $229,733 81. The principal charitable institution supported by the government is the lunatic asylum near Charlottetown, opened in 1848. The number of inmates during the year ending Jan. 31, 1874, was 68 (41 males and 27 females); remaining on that date, 58 (37 males and 21 females). The expenditure on account of the asylum for the 11 months ending Jan. 1, 1874, was $4,542. During the same period $4,409 14 was expended for the almshouse near Charlottetown and $2,663 56 for outside relief for the poor. The public schools are under the general control of a board of education of 11 members, appointed by the lieutenant governor in council. Subordinate to the board are a visitor for each county and a board of trustees for each district. The expense of tuition is defrayed by the province. The following table contains the school statistics for 1874:

PARTICULARS.	KING'S CO.		PRINCE CO.		QUEEN'S.
	Winter.	Summer.	Winter.	Summer.	Year.
Number of schools open..	81	84	96	91	167
Number of pupils register'd	2,970	3,612	4,259	4,531	8,093
Average daily attendance...	1,765	2,136	2,585	2,555	4,553

Adding Queen's co. to the summer term of the other two, the average daily attendance for the whole island is 9,244, and the number of pupils registered 16,236. The number in school some portion of the year is somewhat larger, as many attend only one term. The whole number of teachers employed during the year was 358. The number of school districts is 403. There are several schools among the Acadians in Prince and Queen's counties conducted in French. The instruction in most of the schools is elementary, but there are 18 classed as grammar schools. In only a part of these, however, are classics and the higher English branches taught. Prince of Wales college at Charlottetown, with two professors, is supported by the province, and at the same place are the provincial normal and model schools. The former in 1874 had two instructors and 67 pupils (34 males and 33 females), and the latter one teacher and 129 pupils (46 males and 83 females). The amount expended by the province for educational purposes during the 11 months ending Jan. 1, 1874, was $59,194 83. The principal institutions of learning not supported by the province are St. Dunstan's college (Roman Catholic) and the Wesleyan Methodist academy at Charlottetown. The latter, opened in 1871, admits both sexes, and in 1875 had 10 instructors and 250 pupils (50 in the academic department, 50 in the intermediate, 110 in the primary, and 40 in the infant class). The principal library is the legislative at Charlottetown. A semi-weekly and eight weekly newspapers are published, two of the weeklies being issued at Summerside, the other papers at Charlottetown. In 1871 there were 187 churches, and the number of adherents of the different religious denominations was as follows: Roman Catholics, 40,765; Presbyterians, 29,579, of whom 10,976 belonged to the church of Scotland; Methodists, 8,361; Episcopalians, 7,220; Baptists, 4,371; Bible Christians, 2,709; other denominations, 1,016.—The island belonged to France till 1763, when it was ceded to Great Britain. In 1663, with the Magdalen islands, it was granted to Capt. Doublet, a naval officer, for the purpose of establishing a fishery, but no permanent settlement was made. A few persons settled on the S. coast in the beginning of the 18th century, and after the cession of Acadia (Nova Scotia) to Great Britain in 1713 families began to arrive from there. In 1752 the population was 1,354, and this number was increased by the arrival of expatriated Acadians to 4,100 in 1758, when most of them abandoned the island. It was placed by the British under the government of Nova Scotia, and was divided into 67 townships, which were distributed among about 100 army and navy officers and others having claims upon the government, upon certain conditions of settlement and the payment of certain quit rents. In 1768 the inhabitants petitioned for a separate government, and in 1770 the first governor arrived, though only five proprietors and not more than 150 families were then resident. The first assembly, consisting of 18 members elected for seven years, met in 1773. In 1803 the earl of Selkirk brought out nearly 800 highlanders from Scotland. Responsible government was introduced in 1851, and in 1873 the province joined the Dominion of Canada. The original name, St. John's island (Fr. *Isle St. Jean*), was changed by an act of the legislature, taking effect in 1800, in honor of Prince Edward, duke of Kent, the father of Queen Victoria. The system of land tenure, arising from the original grant of the island, has caused much discontent, most of the proprietors being absentees and the greater part of the inhabitants only leaseholders. Since 1854 the government has adopted the policy of purchasing of the proprietors in block and selling in smaller parcels to the tenants, who are thus enabled to obtain the freehold. At the beginning of 1872 about one third of the island had been purchased, and the greater part of this resold.

PRINCE GEORGE, a S. E. county of Virginia, bordered N. by James river and N. W. by the Appomattox, and drained by the sources of the Blackwater; area, about 350 sq. m.; pop. in 1870, 7,820, of whom 5,046 were colored. It is intersected by the Atlantic, Mississippi, and Ohio railroad, and the City Point branch. The chief productions in 1870 were 47,282 bushels of wheat, 164,050 of Indian corn, 31,890 of oats, 20,798 of peas and beans, 1,800 lbs. of tobacco, 2,408 of wool, and 20 bales of cotton. There were 490 horses, 583 mules and asses, 1,271 cattle, 639 sheep, and 3,791 swine. Capital, Prince George Court House.

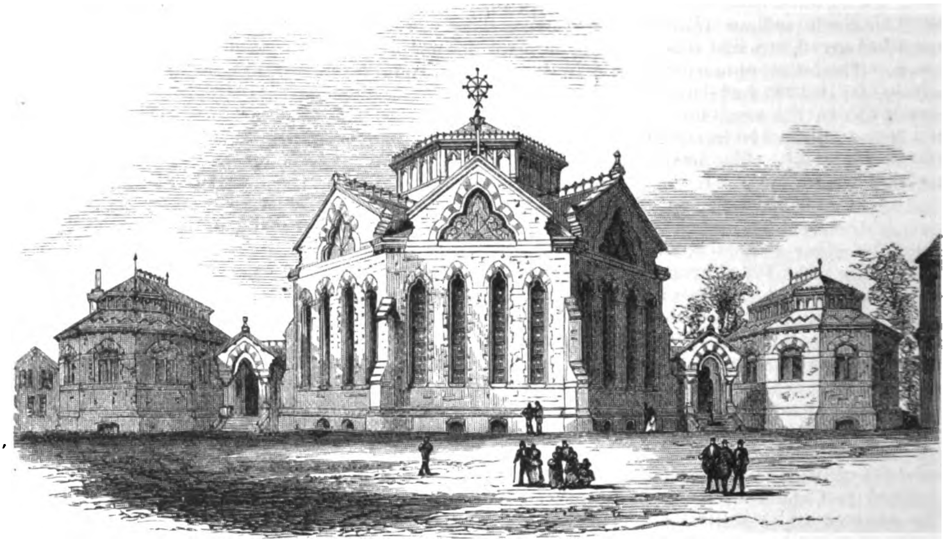
PRINCE GEORGE'S, a S. W. county of Maryland, bordered E. by the Patuxent river and W. by the Potomac and the District of Columbia, and drained by several streams; area, about 600 sq. m.; pop. in 1870, 21,138, of whom 9,780 were colored. Its surface is somewhat hilly and contains great quantities of iron ore; the soil is generally very fertile. It is intersected by the Washington branch of the Baltimore and Ohio railroad, and by the Baltimore and Potomac railroad and the Pope's Creek branch. The chief productions in 1870 were 79,706 bushels of wheat, 23,849 of rye, 518,131 of Indian corn, 57,411 of oats, 60,179 of Irish and 8,099 of sweet potatoes, 69,658 lbs. of butter, 12,997 of wool, 3,665,054 of tobacco, and 6,536 tons of hay. There were 3,434 horses, 2,620 milch cows, 1,247 working oxen, 3,108 other cattle, 4,906 sheep, and 9,045 swine. Capital, Upper Marlborough.

PRINCE OF WALES ISLAND. See PENANG.

PRINCE'S FEATHER. See AMARANTH.

PRINCESS ANNE, a county forming the S. E. extremity of Virginia, bordered N. by Chesapeake bay, E. by the Atlantic, and S. by North Carolina; area, about 400 sq. m.; pop. in 1870, 8,273, of whom 3,902 were colored. It has a level surface and sandy soil, and contains large forests of pine and cypress, affording an important lumber trade. The chief productions in 1870 were 2,831 bushels of wheat, 398,105 of Indian corn, 21,985 of oats, 17,617 of peas and beans, 19,975 of Irish and 39,416 of sweet potatoes, 1,229 tons of hay, 7,105 lbs. of wool, and 25,112 of butter. There were 1,299 horses, 239 mules and asses, 1,538 milch cows, 2,955 other cattle, 8,061 sheep, and 13,564 swine. Capital, Princess Anne Court House.

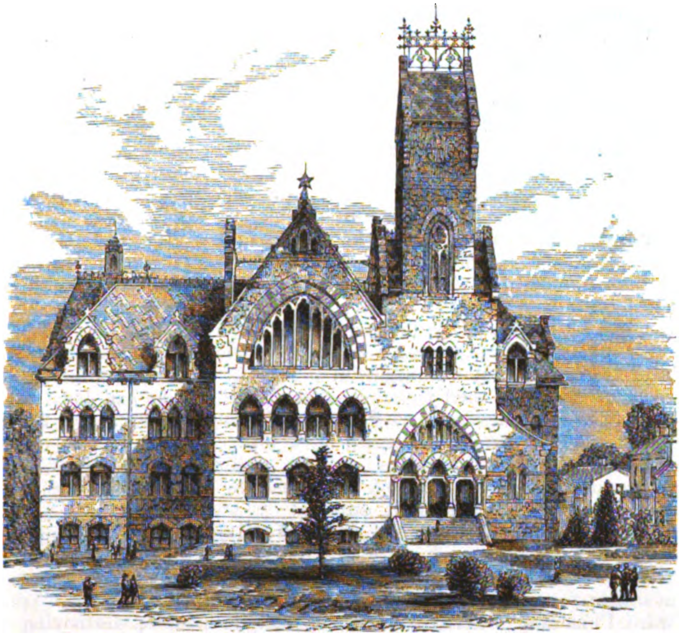
PRINCETON, a township and town of Mercer co., New Jersey, at the terminus of a branch (3 m. long) of the Pennsylvania railroad, 40 m. N. E. of Philadelphia, and 11 m. N. E. of Trenton; pop. in 1870, of the township, 3,986; of the town, 2,798. The town is neatly built and pleasantly situated, and contains a number of elegant residences. It has a bank, two hotels, two public and several private schools, a weekly newspaper, and nine churches, besides the chapels of the college and seminary. The continental congress met here June 30, 1783.—Princeton is the seat of the college of New Jersey, popularly called Princeton college, and of the theological seminary of the Presbyterian church. The college of New Jersey was founded under the auspices of the Presbyterian synod of New York, which then included New Jersey under its jurisdiction. It obtained a charter in 1746, and a more liberal one in 1748. It was opened in May, 1747, at Elizabethtown (now Elizabeth), and the same year was removed to Newark, whence it was transferred to Princeton in 1757, upon the completion of a college edifice, which at the suggestion of Gov. Belcher was named Nassau hall, "to the immortal memory of the glorious King William the Third," "of the illustrious house of Nassau." From this circumstance the college itself is often called Nassau Hall. It suffered greatly in the war of the revolution, and the main building was occupied as a barrack and a hospital both by the American and the British troops. Gen. Washington drove a detachment of British soldiers from its walls at the battle of Princeton, Jan. 3, 1777. (See PRINCETON, BATTLE OF.) Dr. Witherspoon and two of the alumni, Richard Stockton and Benjamin Rush, were signers of the Declaration of Independence. The continental congress and Gen. Washington were present at the commencement in 1783. Gen. Washington presented 50 guineas to the college to repair the building, but the trustees appropriated the sum to the painting of a portrait of Washington by the elder Peale. It is said to occupy the frame which once held the portrait of George II., destroyed by a cannon ball in the battle of Princeton. After the revolution, by dint of great effort, means were obtained to repair the buildings and pay the salaries. Nassau hall was destroyed by fire, March 6, 1802. Funds were collected from friends in the middle and southern states, and the college was rebuilt, and two other buildings were erected for lectures and recitations. Nassau hall was again burned



Library of the College of New Jersey.

March 10, 1855. The old walls still remained, and it was speedily rebuilt, only slightly modified. The civil war affected the number of the students and the funds of the institution very seriously, but friends contributed liberally to its wants. After the close of the war the number of students gradually increased, and on the resignation of Dr. Maclean in 1868 the institution was in a prosperous condition. Dr. Maclean was succeeded in the presidency by the Rev. Dr. James McCosh, of Belfast, Ireland. His administration has been distinguished by great energy and activity, and his high reputation has added much to the college in every way. The faculty has been enlarged, the number of students increased, new departments of study have been added, many fine buildings erected, and the funds greatly increased. Among the benefactors of the college may be named Messrs. James Lenox, John I. Blair, N. Norris Halsted, John C. Green, Henry G. Marquand, and Robert Bonner. Mr. Green has given not less than $750,000 to endow a scientific school, erect a library and a building for lectures and recitations, and for other objects. More than $1,000,000 have been given to the college since Dr. McCosh became president. The presidents of the college have been as follows:

NAME.	Term.
Rev. Jonathan Dickinson	May to Oct., 1747.
Rev. Aaron Burr	1748–1757.
Rev. Jonathan Edwards	Jan. to Mar., 1758.
Rev. Samuel Davies	1759–1761.
Rev. Samuel Finley	1761–1766.
Rev. Dr. John Witherspoon	1768–1794.
Rev. Dr. Samuel Stanhope Smith	1795–1812.
Rev. Dr. Ashbel Green	1812–1822.
Rev. Dr. James Carnahan	1823–1854.
Rev. Dr. John Maclean	1854–1868.
Rev. Dr. James McCosh	1868–



School of Science.

—The college year is divided into three terms. All the studies of the freshman and sophomore years are required; in the junior and senior years a considerable range of elective studies is provided. There are a number of prizes and scholarships obtainable by deserving students. Six fellowships have been established, four of which yield $600 each, the other two yielding $250 each. These are conferred after examination upon members of the graduating class, and the recipients are required to pursue a course of studies for one year in the department for which the fellowship was granted, under the superintendence of the faculty. There is a preparatory school connected with the college. The John C. Green school of science was opened in 1873. It has a course of two years for graduates of colleges, on the completion of which the degree of master of science is conferred, and a course of three years for others, on the completion of which the degree of bachelor of science is conferred. Special courses may also be pursued. In 1874–'5 there were in the college 14 professors, 6 other instructors, and 408 students, of whom 25 were in the school of science and 383 in the academic department, viz.: fellows, 7; seniors, 77; juniors, 113; sophomores, 97; freshmen, 89. The college and society libraries contain 55,000 volumes. The whole number of graduates is about 4,850, of whom nearly 2,750 survive. Among the graduates have been some of the most distinguished men both in church and in state. The various endowments amount to about $600,000. The college buildings are mostly of stone, and occupy the campus, running parallel with the main street of the town. The grounds are well shaded with trees. A quadrangle is formed by Nassau hall on the north, Reunion and West college halls on the west, East college on the east, and the halls of the literary societies on the south. The Philadelphian society's hall and the president's residence are nearer the street. E. of Nassau hall is the elegant new library building; beyond this is Dickinson hall; and at the E. end of the line stands the new and handsome building of the school of science. The gymnasium and the Halsted observatory are near the railroad depot. —The theological seminary, founded in 1812, occupies several plain stone buildings near the college. The regular course is three years, with a post-graduate course of one year. In 1874-'5 there were 6 professors, 1 tutor, and 116 students, viz.: resident graduates, 2; senior class, 32; middle class, 35; junior class, 47. The whole number of graduates is nearly 3,100, of whom about 2,300 survive. The number of volumes in the library is 24,000. The endowment amounts to $400,000.

PRINCETON, Battle of. After the surrender of the Hessians at Trenton, Dec. 26, 1776, Cornwallis resumed his command of the British in the Jerseys, concentrated his forces at Princeton, and advanced (Jan. 2, 1777) with nearly the whole body to Trenton, then occupied by the American army. It was nightfall before the British had established themselves on the W. bank of the Assanpink, a small stream fordable in many places, and crossed by a bridge commanded by the Americans, and Cornwallis postponed the decisive attack till next day. Washington, finding himself opposed by an army superior in discipline and numbers to his own, and cut off from retreat by the Delaware, filled with ice, and impassable within the time available for escape, projected a diversion toward Princeton, where, by attacking and defeating the remaining troops, he could seize upon the supplies and munitions stored there, and thence proceed to capture the British magazines at Brunswick. Gen. Leslie with the rear guard of the British army was at Maidenhead, about half way between Trenton and Princeton, and three regiments of infantry and three troops of dragoons were still at the latter place. Aware of Leslie's position, Washington determined to make a detour by the Quaker road, which within 2 m. of Princeton joined the main road; but it was not in good condition, and it was sunrise before he reached the bridge at Stony Brook, about 3 m. from Princeton. Here he took a shorter and more concealed road, and ordered Gen. Mercer to proceed by the brook and take possession of a bridge at the main road. Thus far the enemy were unaware of his movements. A detachment left at the Assanpink to make a show of preparing for defence was ordered to hasten after the main army at daybreak. The baggage had been quietly removed to Burlington. The British remaining at Princeton had commenced their movement toward Trenton, and Col. Mawhood at the bridge came upon Mercer's brigade. At once both made for a piece of rising ground. It was gained by the Americans, who opened a sharp fire on the enemy, which they vigorously returned, and immediately charged with the bayonet, a weapon of which the Americans were destitute. After a short struggle, during which Gen. Mercer received mortal wounds, they gained the position and drove the Americans before them. But the pursuit was soon checked by the American regulars and a detachment of Pennsylvania militia, under command of Washington. The British opened their artillery on the reënforcement, and attempted by a charge to capture two pieces of artillery manned by the Pennsylvania militia. The action was brief, lasting not more than 20 minutes, but was fiercely contested; Col. Mawhood fought with the most desperate bravery, and, eventually forcing his way by the bayonet to the main road, retreated toward Trenton, leaving two brass field pieces on the ground. Washington distinguished himself by his personal daring. The 55th British regiment was routed and retreated toward Brunswick. The 40th regiment, not having come up in time to participate in the engagement, divided, a portion retreating toward Brunswick and the rest taking refuge in Nassau hall, which for some time had been occupied by the British as a barrack. On the approach of the Americans most of them escaped, and the remainder surrendered after receiving a few shots. The American loss was not more than 30 men, besides Gen. Mercer, Cols. Haslet and Potter, Major Morris, and Capts. Shippen, Neal, and Fleming. The British lost about 200 killed and wounded, and 230 prisoners, including 14 officers. Washington moved on to Morristown, destroying the bridges on his march, and for some time pursued a system of persistent annoyance, which drove the enemy out of nearly the whole of New Jersey.

PRINCE WILLIAM, a N. E. county of Virginia, bordered E. by the Potomac and N. E. by the Occoquan river, and drained by Cedar Run, Broad Run, and Quantico creeks; area, about 325 sq. m.; pop. in 1870, 7,504, of whom 1,813 were colored. It has a hilly surface and sandy soil. It is intersected by the Washington City, Virginia Midland, and Great Southern railroad. The chief productions in 1870 were 47,726 bushels of wheat, 167,250 of Indian corn, 70,068 of oats, 2,280 tons of hay, 1,616 lbs. of tobacco, 13,356 of wool, and 102,668 of butter. There were 1,496 horses, 1,976 milch cows,. 3,406 other cattle, 4,253 sheep, and 5,288 swine. Capital, Brentsville.

PRINCIPATO CITERIORE, or **Salerno,** a province of S. Italy, in Campania, bordering on Principato Ulteriore, Basilicata, and the Tyrrhenian sea; area, 2,126 sq. m.; pop. in 1872, 541,738. On the W. coast is the gulf of Salerno, and on the S. coast that of Policastro and Cape Palinuro. The principal rivers are the Sarno, the Tusciano, and the Sele, with its affluent the Calore. It is traversed by branches of the Apennines, being level only in the portion watered by the lower Tusciano and Sele. Tillage, pasturage, and the cultivation of the vine, olives, and fruits, constitute the principal occupations. The fisheries are famous. The region adjoining Vesuvius is like a garden, and has mineral springs. The province is divided into the districts of Salerno, Campagna, Vallo della Lucania, and Sala Consilina. Capital, Salerno.

PRINCIPATO ULTERIORE, or **Avellino,** a province of S. Italy, in Campania, bordering on Benevento, Foggia, Basilicata, Principato Citeriore, and Terra di Lavoro; area, 1,409 sq. m.; pop. in 1872, 375,691. It is traversed by lofty ridges of the Apennines, and watered by the Ofanto and several tributaries of the Volturno. Near Ariano are marble quarries. There is fine pasturage, wine and olives are produced in fair quantities, and the productions generally suffice for local consumption. The province is divided into the districts of Avellino, Ariano, and Sant' Angelo de' Lombardi, corresponding to three natural divisions formed by the Apennines. Capital, Avellino.

PRINGLE, Thomas, a Scottish author, born at Blaiklaw, Teviotdale, Jan. 5, 1789, died Dec. 5, 1834. He graduated at the university of Edinburgh, and became clerk to the commissioners on the public records of Scotland, which post he held till 1817, when he commenced the "Edinburgh Monthly Magazine," which was the germ of "Blackwood's Magazine." At the same time he was editor of the "Edinburgh Star" newspaper, and joint editor of "Constable's Magazine." He soon quarrelled with Blackwood, and, his other publications being unprofitable, went out to the Cape of Good Hope in 1820, and became government librarian at Cape Town. He established a private academy, founded the "South African Journal," and edited the "South African Commercial Advertiser," both of which were discontinued in consequence of the censorship of the colonial governor. He returned to Great Britain in 1826, and became secretary to the anti-slavery society. His "Narrative of a Residence in South Africa" appeared in 1835. A collection of his poems was published by Leitch Ritchie (1838).

PRINGSHEIM, Nathanael, a German botanist, of Jewish parentage, born near Landsberg, Silesia, Nov. 30, 1823. He studied in several German universities and in Paris, went to Berlin in 1851, and in 1857 commenced the publication of the *Jahrbücher für wissenschaftliche Botanik*, which he still edits (1875). He was professor of botany at Jena from 1864 to 1868. He has chiefly distinguished himself by his minute researches into the anatomy and physiology of cryptogamous plants, demonstrating the presence of antheridia or male organs in various algæ, and establishing the fact of a true bisexual reproduction in several genera. Accounts of some of these discoveries are contained in his work *Ueber die Befruchtung und Keimung der Algen und das Wesen des Zeugungsactes* (1855). Among his other works are: *Grundlinien einer Theorie der Pflanzenzelle* (Berlin, 1854); *Beiträge zur Morphologie der Meeresalgen* (1862); and *Ueber den Gang der morphologischen Differenzirung in der Sphacelarien-Reihe* (1873).

PRINTING (abbreviated from *imprinting*, from Lat. *imprimere*, to press in or on), the art of producing in a pigment reversed copies of characters engraved upon types, stamps, or plates. The essential feature is that the copy is produced in some color by means of pressure. Printing is applied to various ornamental purposes, such as the production of calicoes, technically called "prints," wall paper, and some kinds of carpets (see CALICO PRINTING, CARPET, and PAPER HANGINGS), but more especially to the production of books and engravings. There are three methods of printing: 1, lithography, in which the lines and characters are drawn upon stone with a kind of oily ink or crayon, to which printers' ink will adhere while it is repelled from the moistened surface of the stone, and is transferred by the pressure of a roller or scraper to the paper (see LITHOGRAPHY); 2, copperplate printing, in which the lines and characters are cut into a plate, which being filled with ink, and the surface of the plate wiped clean, the color is taken up on the paper, also by the pressure of a roller (see ENGRAVING); 3, letterpress printing or typography, which alone will be treated in this article, in which the characters, whether upon separate types or on a plate, are raised above the surface, or rather all except the characters is cut away, leaving them standing in relief.—Printing was probably practised by the Chinese as early as the 6th century, but does not appear to have come into general use until the 10th. In 932 two ministers of the emperor presented a memorial that the "Nine Classics," which had hitherto existed only in manuscripts, should be revised and printed; this was done, and in about 20 years copies were in circulation; and by the end of the 13th century most of the literature of former ages had been printed. Since that time the printed literature has become very voluminous, single collections often containing several thousand volumes. In the original Chinese method, which is still the most usual, a written sheet of paper is laid face downward upon a board of hard wood, to the smooth surface of which the ink is transferred, and then all except the inked lines is cut away, as in our process of wood engraving, leaving the letters, or rather words, in relief. The Chinese characters are composed mainly of a combination of simple lines, usually straight or slightly curved or hooked, which greatly facilitates the process of cutting. Each plate forms a page. In printing from this page the workman applies the ink with a soft brush, then lays the sheet of paper upon the plate, and passes another soft brush over the back, thus giving the impression. Usually only one side of the sheet is printed, the other being left blank. Two pages are commonly printed at once, divided by a line down the middle, upon which line they are folded back to back, and fastened together so that the folded edge is in front, the single edges being included in the binding.

Books thus prepared, dating as far back as the Sung dynasty (960–1279), are still extant. Movable types of various kinds have been used in China, and they have of late been introduced to a considerable extent by the missionaries; but the immense number of separate characters required makes their manipulation very difficult, and the system of block printing described is still the prevailing one. (See CHINA, vol. iv., p. 483.) Printing was probably introduced from China into Japan at a very early date, the general methods being the same; but within a recent period an alphabetical syllabary of 48 characters has been formed, by the use of which movable types are much more available than in Chinese.—Block printing, essentially after the Chinese method, was practised in Italy, Spain, and Sicily, for designs on fabrics of silk and cotton, which were printed in ink, as early as the last ten years of the 12th century. This method was also used in the production of playing cards, and somewhere near the beginning of the 15th century for illustrated manuals of devotion, each page containing a picture and a few lines of reading, all engraved upon a single block. One of the earliest specimens of this kind bears the date of 1423. The most notable "block book" known is the so-called *Biblia Pauperum*, a small folio of 40 leaves, which existed in many manuscripts from about the year 1300, and is supposed by some to have been engraved and printed as early as 1400; but other and probably better authorities place the date at not earlier than 1430, a few years before the European invention of movable types, which form the essential feature of modern typography. Practically, the art of printing waited for the development of the manufacture of paper, which, according to Hallam, was not a staple of commerce before the close of the 14th century. There is still some question as to the time when, the place where, and the persons by whom movable types were invented and brought into practical use. The honor rests between Laurens Coster of Haarlem (died about 1440), Johann Gutenberg of Mentz (died about 1468), Johann Faust or Fust of Mentz (died about 1466), and Peter Schöffer, the son-in-law of Faust (died about 1502). Dutch authorities have generally held that Coster was the real inventor, and that Gutenberg, one of his workmen, stole the invention, and claimed it as his own. They place the date of the invention in 1423, and in July, 1823, the fourth centennial of the event was celebrated at Haarlem with great pomp, and a monument to Coster was erected in the Haarlem wood. But Van der Linde, in the "Haarlem Legend of the Invention of Printing" (London, 1871), endeavors to prove that Coster was a tallow chandler and innkeeper; that printing was not done in Haarlem before 1483; and that Jacob Bellaert was the first printer there, and his types were made by Gerard Leen. German authorities regard Gutenberg as the real inventor. According to them, he practised the art at Strasburg as early as 1436, and in 1438 had there movable types, a press, and all necessary appliances for printing. In 1450 he entered at Mentz into partnership with Faust, a wealthy citizen, who supplied the requisite capital; but the partnership being dissolved in 1455, Faust obtained possession of most of the material, and carried on the business by himself, and subsequently in partnership with Schöffer. Gutenberg also appears to have carried on the business of a printer until about 1465. As he never affixed his name to the colophons of his early books, there is still doubt as to how many were actually printed by him. In 1456 he completed the printing of the Bible in Latin, a folio volume of 637 leaves, printed on vellum, with types imitating manuscript in form, and illuminated by hand. The work must certainly have occupied several years, and so have been mainly executed while Faust was in partnership with Gutenberg. The art was conducted at Mentz, with the utmost precautions against the divulging of the secret, till 1462, when, the city being besieged by Count Adolphus of Nassau, the printing houses were broken up, and the printers scattered themselves into various countries. The art was first practised in Italy in 1465, at Subiaco in the Roman territory, and in Rome about four years after, the date of the first Roman book being given by Panzer in 1470. It was introduced into Paris, Milan, and Venice in 1469; into England, at Westminster, probably in 1474, by Caxton; into Barcelona, Spain, in 1475, and into various other cities of Europe about the same time. In 1500, it is said, there were about 200 printing offices in Europe. The first printing press in America was set up in Mexico in 1536; then followed Lima, 1586; Cambridge, Mass., 1639; New London, Conn., 1709; Charleston, S. C., 1730; and Newport, R. I., 1732. The first press west of the Alleghanies was at Cincinnati, in 1793; the first west of the Mississippi at St. Louis, in 1808.—The art of printing comprises two distinct parts, which are usually but not always carried on in the same establishment. "Composition" consists in arranging the types in proper order into words and pages. "Press work" is the taking of impressions from the types or from casts of pages made from the types. Technically the workmen who arrange the types are styled "compositors;" those who take the impressions, "pressmen;" but both are called printers. In small offices, where hand presses are used, the same workman executes both kinds of work; in larger offices only one. Types are small bars of metal, with the letter in relief upon one end. They are all cast of a uniform height, the standard, both in England and America, being $\frac{92}{100}$ of an inch. They are of different sizes, each having a distinctive name, arbitrarily given, and differing in different countries. The largest size usually employed at the present day for books is called pica, of which 71·27 lines go to a foot. Then follow small pica, 80 lines; long primer, 89·79; bourgeois, in which this Cyclopædia is printed, 100·79; brevier, 113·13; minion, 126·99; nonpareil, half the size of pica, and the smallest size usually found in books, 142·54. Several smaller sizes are occasionally used, especially for very small Bibles and in newspapers. Among these are agate, 160 lines to a foot; pearl, half the size of long primer; and diamond, 201·58 lines to a foot. Brilliant, next below diamond, has been used in this country for marginal notes in Bibles. Smaller sizes still have been made, chiefly as curiosities. A page of nonpareil will contain about four times as much matter as one of the same size in pica; a page of pearl four times as much as one in long primer. Types larger than pica were formerly and are yet occasionally used in books. Among these are English, 63·49 lines to the foot, and great primer, 50·39. Still larger sizes, used in show bills, are usually named from their size as compared with pica; as two-line, four-line, six-line pica, and so on. In the following list the different sizes are exhibited, each with its own name:

Great Primer, English, Pica,

Small Pica, Long Primer, Bourgeois,

Brevier, Minion, Nonpareil, Agate, Pearl, Diamond, Brilliant.

The different letters vary in thickness. The m, which was originally square, is with us taken as the standard for measuring the quantity of matter in a page, and in that relation written "em." In England and most European countries the standard is the "en." A thousand ems is the space which would be occupied by 1,000 squares of a type of the font. Compositors are usually paid by the thousand ems, or in Europe by the thousand ens. Types average in thickness about two and a quarter to an em or square, so that 1,000 ems are about 2,250 characters of solid matter. A line of this Cyclopædia measures 21 ems, and there are 132 lines to a page, which thus contains 2,772 ems. A font of type is a collection of all the characters, each apportioned in quantity to the work for which it is intended; and the pieces of whatever kind are designated as "sorts." The size of a font varies from a few pounds up to several tons in weight. The proportion of the different sorts in a font varies greatly. For an ordinary work in English, say a history or a novel, the relative ratios of the different "lower case" or small letters is about as follows: z, 1; k, j, q, x, 3; b, v, 7; g, p, w, y, 10; c, f, u, m, 12; d, l. 20; h, r, 30; a, i, n, o, s, 40; t, 45; e, 60; total, 532.—The compositor's "case" is a shallow box, 32½ in. long and 16¾ in. wide, though smaller ones are gradually coming into use. Two such cases are required, which are placed in a sloping position on a stand or "frame." The lower case, as arranged for ordinary work in English, has 54 compartments or "boxes" of different sizes. This suffices for the 26 small letters (hence designated "lower case" letters), the numerals, marks of punctuation, and spaces. The last consist of blank pieces of metal lower than the type, of eight sizes, varying from "hair spaces," six or seven to an em, to "three-em quads" (quadrats), *i. e.*, pieces equal in length to three ems, used for filling out blanks. The upper case, which is placed on the frame in a more sloping position, is divided into 98 boxes of equal size; in these are the capitals and small capitals, which, including the diphthongs, number 60, leaving 38 for various other sorts. In the lower case the sorts are so arranged as to place those in most frequent use as near as possible to the hand of the compositor. In the upper case the letters are usually arranged in alphabetical order. The entire number of sorts (capitals, small capitals, lower case, numerals, punctuation marks, spaces, &c.) is about 140 for ordinary work. For special works, such as a dictionary in which are used letters marked for special purposes, accented letters, mathematical and chemical symbols, &c., 100 or more additional sorts are required, which are usually kept in separate cases. The Italic letters, capitals and lower case (Italic small capitals not being usually furnished), are kept in a separate pair of cases arranged as in the Roman cases. French, German, Spanish, and other European languages require about the same number of sorts as English; so does Greek, when printed without accents and breathings, but with them about 200 regular sorts are required. The early type founders, trying to imitate calligraphy, introduced into their Greek fonts many contractions and combinations, raising the number of sorts to about 750; but these have long since been abandoned. Many of the early printers also made their own type; but this has now become a separate trade. (See TYPE.) The letters, each of which is cast separately, must be "true" in every way. If one were too low by $\frac{1}{800}$ of an inch, it would not appear in printing; if so much too high, its impression would be heavier than those adjacent to it. If the body of the type were not mathematically accurate, a great number of them, when made up into a page, could not be held together in a solid mass.—*Composition.* The tools used by the compositor in setting type consist only of a composing "stick" and a "rule." The former is a frame of metal, generally steel (though for very large work wood is used), with a bottom and three sides, one of which is movable, so that by a screw it can be adjusted to lines of any length. For ordinary work it is about 6 in. long and will hold about 14 lines of bourgeois. The rule is a piece of smooth metal of the length of the line, and as high as the type, with a projecting nib at the right-hand corner for convenience in shifting. Besides these, a bodkin is used for picking out letters in correcting proofs. The compositor stands in front of the frame upon which are his cases; his "copy" is before him, usually lying on the right-hand side of the upper case. Holding the "stick" in his left hand, he reads a few words of his copy, as many as he can readily remember for a few moments, and with his right hand picks up the types one by one and places them in the stick, so that they rest standing against the rule. He does not pick up the required letter at random, but almost unconsciously fixes his eye upon one which happens to be in a favorable position. He does not look upon the face of the type, but at the "nick" or nicks cut into one edge near the foot, which part is to be placed outward in the stick. When a line is completed he "justifies" it by evenly increasing or diminishing the amount of space between the words, so as to make it end with a word or syllable. The letters occupy a reversed position, but the compositor reads them as easily as he would on the page printed from them. The line being justified, he places the rule after it, and proceeds in the same manner until his stick is full. The emptying of the stick is a dexterous process, requiring practice. The rule being placed after the last line in the stick, the forefinger of each hand presses against it, the two thumbs bearing strongly upon the first line in the stick, and the middle fingers upon the ends or sides of the lines; then by a quick motion, while the stick is held down upon the case by the little finger of the left hand, the matter is lifted out and placed on a "galley." This is a long tray of wood or metal, with the sides and upper end raised, against which the type rests secure. Leads are thin slips of metal placed between the lines to give a more open appearance to the matter, which is then said to be "leaded."—When some of the sorts are nearly or quite exhausted, the cases are said to be "empty," and are filled by distributing type which has been printed or stereotyped from, then called "dead matter." The process is one requiring great care and precision, but an accomplished workman performs it with surprising rapidity, "throwing in" as many as 7,000 or 8,000 separate pieces in an hour. He takes up in his left hand as much as he can conveniently hold upright, with the nicks upward, resting on his rule, supported by the curved little or ring finger at the bottom, and the thumb and other fingers at the sides. With the right hand he takes a word or number of letters between the thumb and forefinger, reads them, and by rapid motions drops each into its own box. Upon the care with which this is done, to avoid "fouling the case" by getting the letters in the wrong boxes, largely depends the accuracy and rapidity of his subsequent composition.—When the compositor has filled a galley, an impression is taken from the type called a "proof," and the work of the proof reader begins. The proof is first collated with the copy. Usually an assistant reads the copy aloud, while the proof reader is on the alert to detect any variations between what he hears and what he sees on the slip before him, all of which he indicates by suitable marks on the proof. This proof is given to the compositor for correction; the proof reader next revises it, by comparison with a new proof, to see that all the errors have been corrected, and then reads the revised slip, which is called the "second proof." Sometimes several proofs are read. In large offices, where there are several readers, the various proofs are usually read by different persons, it being presumed that one may detect some error which has escaped another. Usually a corrected proof is sent to the author for his revisal and emendation. For convenience a somewhat elaborate system is in use among printers, in which each possible error is noted by a special symbol (see CORRECTION OF THE PRESS); but for an author it is sufficient to erase anything wrong and to write the correction clearly in the margin.—*Composing and Distributing Machines.* We have thus far considered "composition" as purely manual, and such it has been until recently, and still is with few exceptions. A fair day's work for a good compositor is about 6,000 ems, or a little more than two pages of this Cyclopædia. During this century several attempts have been made to produce machines by which the work might be accomplished more expeditiously. A feature common to all composing machines is that the types, instead of being deposited in boxes as in the case, are placed in lines, each sort by itself, in perpendicular channels at the back of the machine. The earliest attempt to invent a composing machine appears to have been made about 1820 by Dr. William Church of Connecticut, who combined with it an apparatus for casting the type for it as wanted, thus doing away with the operation of distributing; this was patented in England in 1822, but does not appear to have come into practical operation. Recently the idea has been revived and improved upon by Mr. Westcott of New York, whose

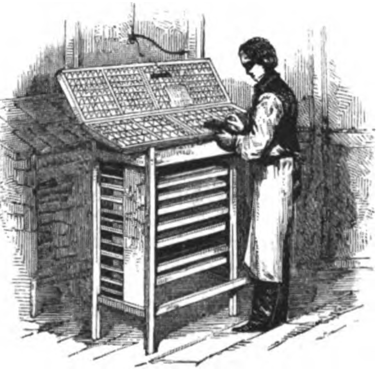


FIG. 1.—Compositor at Case.

machine for type casting and setting is very ingenious. About 1846 Timothy Alden of Massachusetts, subsequently of New York, began the construction of a composing and distributing machine, and after his death in 1858 his brother Henry W. Alden made further improvements. This machine set and distributed the types simultaneously; but as this did not work satisfactorily, two machines have been recently (July, 1875) built under the direction of Mr. A. C. Richards: one a distributor, which is automatic, having for its fundamental principle Alden's idea of an excavated rim, which, by means of conveyors in a cylinder revolving horizontally, guides each type to its proper place; the other, the type setter, consisting of upright channels containing the type, and an endless band with belts at the two sides, which together conduct the types to the mouth of the receiving channel, where they are placed upright in a continuous line. In the French exposition of 1855 several machines were exhibited, one of which, by Christian Störenson of Copenhagen, was pronounced by M. Didot and the other judges to "approach nearer than any other to the accomplishment of the long desired object." This machine composed and distributed simultaneously; the matter was placed in a kind of basin, from which the machine picked out each letter, depositing it in proper position in the composing part. The distribution was effected by having a special set of nicks on each sort, no two having the same arrangement. The types passed by their own weight along a channel in which were openings with projections corresponding to the respective nicks in the type, each one of which is prevented from passing through any but its proper hole, just as the wards of a lock prevent any key except its own from turning. This machine, it was said, would do about as much work as three compositors. Other machines, working with much greater rapidity, have been produced. One by J. H. Young of England (1840) is said to have composed 13,000 sorts an hour, but the type had to be distributed and justified by hand, occupying three other persons. In 1853 Mr. William H. Mitchel of New York produced a very ingenious composing machine, of which ten were at one time in operation in a single office. This machine is in shape like a harpsichord piano, with 34 channels standing in a nearly vertical position across its entire length, and with a corresponding keyboard. In connection with each channel is an endless belt of linen tape, which conveys the type to the receiving belt running obliquely across the line of all the others, by which it is deposited on a wheel similar in shape to a coarse circular saw, which places it in an upright position in a continuous line on the receiving channel. The arrangement is such that the types travel the same distance before reaching the receiving channel, so that, however rapidly the keys may be touched, each will appear in its order. In the distributing machine, invented at a later period, the types are arranged in a single line in a channel placed upon the top of the machine, along which they are pushed by means of a weight suspended over a pulley. On the backs of the types are nicks, different for each letter. The types drop one by one into open slots in a cylinder revolving horizontally, where they hang suspended by a pin at a height governed by the nicks; the bottom of the types reach below the edge of the cylinder, which in the course of its revolution brings each letter opposite to its receiving channel, where it touches a small projection fixed in the stationary rim below the cylinder, by which it is displaced from the slot, and drops in a perpendicular position into the channel; this when full is transferred to the composing machine. Several other machines have been invented and in use in England, among which are those of Robert Hattersley of Manchester (1856), and A. Mackie of Warrenton (1865); the latter is still engaged in perfecting his invention. A very recent machine, which after more than 20 years' labor has been produced by M. Delcambre, a native of France, is now (1875) on trial in New York, under the care of the inventor. The types are arranged, as in other machines, in perpendicular channels, from which they are liberated by keys; each when set free falls upon an inclined plane of metal, in which is a separate groove for each sort, through which it slides by its own gravity until it reaches the receiving channel. These grooves have a curvilinear, sometimes a winding course, so that each sort, however distant may be its original position from the point of delivery, has the same space to travel, and thus each must reach that point in the order in which its key was struck. The grooves often cross each other, but at each point of intersection is a valve which by the striking of the key moves so as to open the required groove and close the other. The distributing machine, also operated by keys, takes the types from the page and distributes them into slides for the composing machine. These machines occupy but little space, and will without adjustment set and distribute two or more sizes of type.—In all the above mentioned machines the labor of justifying, which is equal to nearly one half of the whole, must be performed by hand. In 1852 Charles W. Felt of Salem, Mass., began work upon a machine designed, as he says, "to distribute, set, and justify the type, and also to lead the matter and make a register of the same, by which distribution and resetting of the same could be performed by the machine automatically." This is the only machine by which all the work pertaining to composition has been accomplished; but it has not yet been sufficiently simplified for practical use. Mr. Felt is now engaged in perfecting a justifying machine to be used with any type setter.—*Stereotyping and Electrotyping.* The proof slips having received the final correction, the matter is made up into pages; and these, if the impressions are to be taken directly from the type, are imposed, or arranged upon a table of stone or iron, properly separated by strips of wood or metal called furniture, in such a manner that when the printed sheet is folded they will follow each other in regular order. The form, as such a collection of pages is styled, is then wedged up in an iron frame called a chase, and is ready for the pressman. But frequently, and with us usually, the printing is from casts or plates, called stereotypes (Gr. στέρεος, solid, and τύπος, type), from these type pages. The advantages of this are numerous, the chief of which are the ability to print according to demand, thus obviating the risk of loss by miscalculation of the market, the saving in wear of type and of the cost of resetting for new editions, and the facility for correcting errors in the plates discovered after the first or any subsequent impression. In the case of books like the Bible for which there is a constant demand, it was long ago found expedient to keep the type standing, at great expense from the quantity required, and work off a new edition only when the preceding one was nearly exhausted. But there was great risk that in repeatedly handling pages, each made up of thousands of separate pieces, some would be disarranged. To obviate this, Van der Meyer of Antwerp, early in the last century, formed pages into solid plates by soldering the type together at the bottom; but as this did not release the type so that they could be used again, the pages, each nearly an inch thick, for a large book formed an exceedingly costly pile. The art of casting solid plates in a mould from a page of type appears to have been first practised by William Ged, a goldsmith of Edinburgh, about 1731. His moulds were taken in plaster of Paris, and he prepared plates of a Bible for the university of Cambridge; but these were mutilated by the jealous printers, and were cast aside, and the process was abandoned for many years. In the mean while several other plans were tried. Firmin Didot of Paris had types made of a hard alloy, and the pages were impressed upon a sheet of soft lead, thus making a mould. Melted type metal was poured into a shallow tray, and just when it was at the point of solidifying, but still soft, the lead mould was laid upon its surface. In this state the two metals will not adhere, and thus a cast was obtained. This method was only partially successful; it could not be employed for large pages, and the plates were often imperfect. M. Cares of France (1786) made his mould by pressing half-melted lead on the form; into this mould he poured melted lead, and pressed it when cooling. Earl Stanhope, near the beginning of this century, reintroduced Ged's process with many improvements. One or more pages are locked up in a chase, and the surface of the type, having been oiled to prevent adhesion of the mould, is then covered with semi-fluid plaster of Paris; a little salt is mixed with the plaster to facilitate setting, and is kept from spreading by a raised metal framework around the pages. When the plaster has set, it forms an almost perfect mould, which is carefully removed and trimmed with a sharp knife. The moisture in the moulds was formerly expelled by baking in an oven for about two hours, but this is now done in less than five minutes after they are placed in the casting pan, by first suspending it over the pot of melted metal and then allowing it to float on its surface; thus the whole process of taking the mould and casting the plate can be accomplished in less than an hour. The composition used is softer than type metal, consisting of 91 parts of lead, 5 of antimony, and 4 of tin. Several moulds are placed side by side, face downward, on an iron floater in the pan; the latter is 1¼ in. deep, and so constructed that when submerged in the melted metal this flows in under the moulds, pressing them up against the cover, and forming plates about a quarter of an inch thick. The pan is then removed and gradually cooled with water, and the plates are freed from plaster and superfluous metal, and shaved on the back by a machine to a uniform thickness. They are then "picked" with suitable tools to free them from remaining bits of plaster or metal in the hollows of the letters or between them, and defective letters are made perfect, or cut out with a small chisel and replaced by type soldered in and cut off at the back. In this manner also errors subsequently discovered are corrected; or if an error involves two or more lines, a "piece" is cast and soldered in, in place of the corresponding piece of the plate, removed by saw and chisel. Each plate is clamped to a wooden block of such thickness that both together are exactly type-high, and the blocks are imposed in a chase and the printing is performed as with type. When the edition of a sheet is printed, the plates are taken from the blocks, upon which another set is clamped. Stereotyping was introduced into the United States in 1813 by David Bruce of New York; the first book produced by it was a New Testament, in 1814. A more expeditious but less perfect method, called the papier maché process, was first used for books in France in 1848, and a few years later in New York. In 1861 it came into use in New York for daily newspapers of large circulation, and its application has since been greatly extended. The material for a matrix is formed by taking a damp sheet of thick unsized paper, and laying over it a number of sheets of moistened tissue paper until the whole is as thick as stout pasteboard. The under side, lightly covered with pulverized French chalk, is laid upon the face of a page of type and beaten with a stiff brush so as to force the soft paper into all the interstices of the type. Other sheets of adhesive paper are added until a sufficient thickness is attained. The whole is then covered with a woollen blanket, and placed in a press the bed of which is moderately heated, and the press screwed down. The heat soon dries the matrix, which is removed from the type and placed in the casting box, the interior of which is curved so that the plate when cast will conform to that of the cylinder of the rotary press upon which it is to be printed. The melted metal is poured in, and the plate cooled by immersing in water the box which contains it; the edges are trimmed, and the back is planed down to the required thickness, when it is ready for the press. Thirty-five minutes is sufficient for the whole process, but if necessary it can be completed in half the time; and any requisite number of duplicates can be made.—For other purposes the plaster process of stereotyping was almost universally used in this country until about 1850, when it began to be superseded by the far better process of electrotyping. For the scientific theory of this, see Gᴀʟᴠᴀɴɪsᴍ, vol. vii., p. 601. The practical operation is as follows: Upon a form, prepared as for stereotyping, is laid a sheet of wax covered with a coating of graphite (black lead), secured in a shallow pan called the moulding pan. This is submitted to a strong pressure, which forces the face of the type, and even the most delicate lines of a woodcut, into the soft wax, thus forming an absolutely perfect mould. This is again black-leaded, which gives it a conducting surface, upon which copper will be deposited from a solution of blue vitriol (sulphate of copper) by means of an electric current from a galvanic battery. The mould is placed in a tank of this solution, and the electric current established, the mould forming a part of the circuit; the copper set free from the solution attaches itself to the graphite on the mould. Silas P. Knight of New York has introduced a more expeditious process. He pours a solution of sulphate of copper over the graphite of the mould, and then dusts upon it fine iron filings. Decomposition and recomposition take place immediately; the acid leaves the copper and unites with the iron, forming a solution which runs off, while a film of the liberated copper is instantaneously deposited all over the surface of the mould; this is then placed in the bath, where it remains until a deposit of sufficient thickness, usually about that of ordinary drawing paper, has been formed. This shell looks as though the letters had been formed by punches upon a thin sheet of copper, being in relief on one side and in intaglio on the other. As it would be crushed in by the pressure of the printing press, it must be backed up with metal. The shell is placed face downward in a casting pan, and its back washed over with a solution of chloride of tin to make the metal adhere; a sheet of tin foil is then laid on, and the pan is heated to about 450°, when the tin melts; melted metal is then poured in, and a solid plate is formed. When the batteries are employed to their full capacity, the cost of an electrotype does not exceed that of a stereotype plate. An electrotype plate will wear much longer and give more perfect impressions than a stereotype, and is less liable to injury from careless handling; it also reproduces more perfectly the fine lines of type and of woodcuts, impressions from electrotypes of the latter being practically as good as those from the original engravings.—*Printing Presses.* It is probable that the earliest impressions were taken by a mallet and planer (a smooth-faced block of hard wood used for levelling the type before printing), as proof slips now often are, or by a brush in the Chinese manner; but presses were soon invented for the purpose. There are engravings representing the press as it existed about 1520. It was large enough to print only two folio pages, and for this two pulls were required. The force was applied by a simple screw and lever. About 1620 Blaeuw of Amsterdam produced a greatly improved press, which with little alteration continued in use for more than a century and a half. The press upon which Benjamin Franklin worked in London in 1725 is preserved in the patent office at Washington; it is a clumsy structure, almost entirely of wood, known as the Ramage press, of which many were still in use more than a century later. Iron was subsequently used for some of the parts; and about the beginning of the present century Earl Stanhope invented a press entirely of iron, the frame cast in one piece, and the power imparted by a combination of the toggle-joint and lever. The Columbian press, invented by George Clymer of Philadelphia about 1817, was the first important American improvement; the power was applied by a compound lever, consisting of three simple levers of the second order. This was largely superseded by the press of Peter Smith, and that in 1829 by the Washington press of Sam-

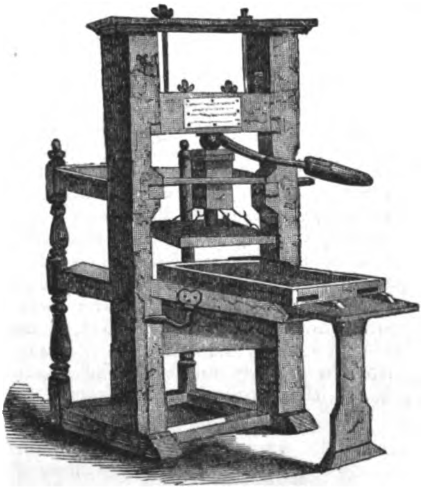


Fig. 2.—Franklin's Press.

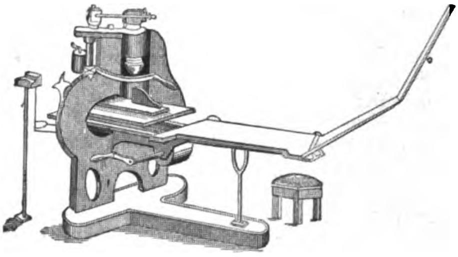


Fig. 3.—Lord Stanhope's Press.

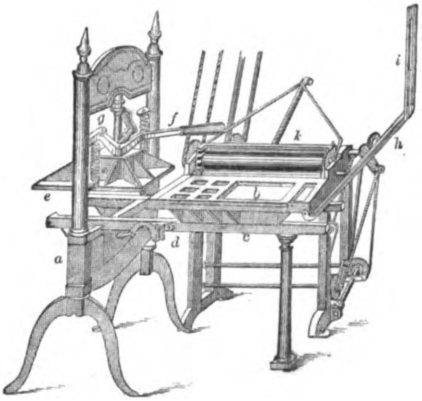


Fig. 4.—Washington Press.

uel Rust. In this the frame was made in sections, the principal parts of wrought iron, and was comparatively light; the power was applied, as in Stanhope's press, by a toggle-joint and lever. The essential parts of a press, as shown in fig. 4, are as follows: *a*, the iron framework, closed at top and bottom to resist the force of the levers; *b*, the bed, on which the types are placed; *c*, one of the two rails or grooved channels on which the bed slides as it is moved forward to receive the impression of the levers; *d*, the rounce or crank, attached to a pulley which moves the bed to and fro; *e*, the platen, or pressing surface, which covers the bed before impression is given; *f*, the bar, which gives the impression by straightening the levers and depressing the platen; *g*, the spiral spring, which gives a quick return movement to the platen after impression; *h*, the tympan (sheets of muslin and paper, stretched on a frame of wood), on which the sheet to be printed is placed; *i*, the frisket, a mask of perforated paper stretched on a frame of thin iron, to prevent soiling of the sheet by ink; *k*, the inking roller and its frame. Preparatory to taking an impression, the frisket is folded down on the tympan, the tympan is folded down on the bed, which operation places the sheet of paper on the inked types, and the bed is then moved under the platen. The ink was formerly dabbed on by two soft leather-covered balls affixed to handles, which one pressman kept rubbing together to distribute the ink evenly, while the other worked the press; the pressmen usually alternated in this. Rollers, made of several thicknesses of cloth, wound around a wooden cylinder and covered with soft leather, were afterward introduced; these were superseded by rollers composed of glue and molasses melted together, and cast in a mould around a wooden cylinder. It still required one person, usually a boy, to apply the ink, and another to work the press. Later a self-inking apparatus was affixed to the press. With this the pressman, in giving the pull, raises a weight, which in its descent draws the roller over the form; one man, though with a considerable increase of exertion, is thus able to do the work of two. A good pressman will work off about 2,000 impressions a day; but he cannot well run a press large enough to work a sheet of more than eight octavo pages.—Repeated attempts were made to contrive a power press capable of doing work as well and more rapidly than the hand press. The first produced in America were by Daniel Treadwell of Boston, in 1822. His machines were used in New York by the American Bible society and the American tract society; in the former they were driven by steam power, and in the latter by mules. The Adams press, invented in 1830 by Samuel Adams of Boston, and since improved by Isaac Adams, has in this country superseded all other platen presses. Its principle is virtually the same as that of the Washington hand press, only that the impression is given by raising the bed upon which the form rests against a stationary platen, instead of bringing the platen down upon the bed. The sheets are placed one at a time upon the feed board, so that the edge is caught by a set of iron fingers which pull them down upon the frisket, which slides between the inked form and the platen, and the form then rises and gives the impression. The sheets, in passing back toward the inking apparatus, pass over a bellows the top of which is perforated with small holes, and are lifted or rather blown upon a set of endless tapes; from these they are taken by a light frame, which, turning upon an axle at the proper moment, whirls them over, laying them in a regular pile at the end of the press opposite to that where they were received. The inking apparatus is quite complicated. A roller slowly revolves, its lower surface immersed in a trough of ink, so adjusted as to take up a quantity proportioned to the depth of its immersion, which is regulated by screws. Another roller, called "doctor" (Lat. *ductor*, leader), touches this at every impression, and transfers a portion of ink to the first of a set of distributing rollers, revolving in contact, one of which has also an oscillating motion, and still another, called the "crab," travels back and forth over the entire length of the others. By these means the ink is uniformly distributed, and is then taken up by the inking rollers; two or more of these, arranged in a frame, pass over the form, transferring to it the required amount of ink. The Adams press as now made will work about 1,000 impressions in an hour. All the operations, except that of feeding the sheets, and sometimes even that, are performed automatically.—For some kinds of work, especially for newspapers, still greater rapidity was needed; and for this it was necessary to employ a rotatory motion in some form. The first successful attempt was made in London by Friedrich König, a German mechanist. His press was first used for the "Times" newspaper in November, 1814. In this the form of type moved horizontally, and it could give about 1,800 impressions an hour. In 1827 this was superseded in the "Times" by the simpler and more rapid machines of Cowper and Applegath. An improved machine of this kind, having eight impression cylinders, and capable of producing from 8,000 to 12,000 copies an hour, was built for the "Times" in 1848, and was used for several years, when it was for a time replaced by Hoe's American rotary press. A number of machines of this general character have been invented in Europe and America. Among cylinder presses manufactured in this country are those of Hoe, A. B. Taylor, Potter, Campbell, and Cottrell and Babcock, each of which has its distinctive merits. The so-called "stop cylinder" presses are used for the finest cut and book work. These have a flat bed which runs back and forth under a large revolving cylinder. The sheets are fed by hand to this cylinder, which catches the edge by a set of iron fingers, and in its revolution brings it upon the form. The bed and cylinder are geared together, so that their rates of motion are uniform. The inking apparatus is quite perfect, and the machines do good work, even upon woodcuts, at the rate of about 1,200 impressions an hour. For newspapers of large circulation the cylinder press has been superseded by the rotary or type-revolving press, in which the form is placed upon a portion of the circumference of a large drum or cylinder. The impression is given by smaller cylinders, to which the paper is fed by hand, each having its own inking apparatus. The number of these impression cylinders was increased to as many as ten, the machine then working off ten sheets at each revolution of the drum. The idea of the rotary machine was suggested in England as early as 1815, but was first brought into practical use in 1847 by Richard M. Hoe of New York, in a machine which would print on one side 15,000 or 20,000 sheets an hour. This was soon adopted by nearly all the leading American daily newspapers, and by several in the principal cities of England and Scotland, and also in Australia.—Within a few years a great advance has been made in the invention of "perfecting" machines, by which a paper is printed on both sides at one operation, from a continuous roll. The Walter machine, upon which the London "Times" and the New York "Times" are now printed, gives 11,000 perfected sheets an hour. It requires two men to pile up the sheets as cut apart from the roll. The Bullock press, invented by William A. Bullock of Philadelphia, receives the roll after being dampened by a separate machine, cuts the sheets apart, and delivers them piled up at the rate of 8,000 to 11,000 an hour; its action is entirely automatic. To the Victory press is attached a folding machine. It will print, separate, fold, and deliver in order about 8,000 an hour of an eight-page newspaper, of 50 in. square; or it will print, cut, fold, and paste at the back a 24-page sheet at the rate of 7,000 an hour. The accompanying illustration presents a sectional view of this machine, showing the positions of the several parts, the course followed by the sheets being indicated by arrows. In the Hoe perfecting press, the rolled-up sheet is more than 4½ m. long, equal to about 10,000 newspapers. The machine has three pairs of cylin-

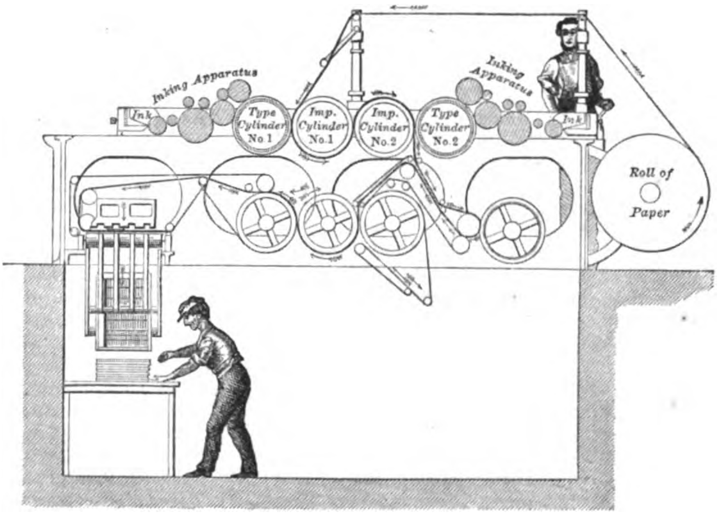


FIG. 5.—Victory Press.

ders geared together, the circumference of each being just equal to the length of the required sheet. The curved stereotype plates occupy the periphery of one cylinder, which is furnished with an ink fountain and rollers; the other is the impression cylinder. The paper on passing between them is printed on the first side, and then going on to the second pair of cylinders, presenting its blank side to the form, receives the impression on that side. It then passes on to the cutting cylinders, one of which bears on its periphery a vibrating knife, which at each revolution enters a groove in the opposite cylinder, cutting off a sheet. The sheets are carried forward by endless tapes, and are finally delivered to the flyer, which piles them up. A counter is attached, which shows the number of sheets printed. The machine is about 20 ft. long, 6 wide, and 7 high, and will give 12,000 or more perfected sheets an hour. Several of these machines are in use in London as well as the United States, and two are now (1875) building for Australia. A great variety of small presses for circulars, bill heads, cards, &c., are in use, some of them of very ingenious structure, working rapidly, and generally moved by foot treadles.—For printing in different colors, as many separate forms and impressions were formerly required as there were colors; but an inking apparatus which can be attached to an ordinary printing press has been invented by Israel L. G. Rice of Cambridge, Mass., by means of which any desired number of colors can be printed at a single impression, but only in bands or stripes.—The bibliography of printing is very voluminous. For its origin and early history see the works cited under Coster and Gutenberg, and also Schaab, *Die Geschichte der Erfindung der Buchdruckerkunst*, &c. (3 vols. 8vo, Mentz, 1830–'31); Wetter, *Kritische Geschichte der Erfindung der Buchdruckerkunst durch Johann Gutenberg* (8vo, Mentz, 1838); Theodor O. Weigel, *Die Anfänge der Buchdruckerkunst* (2 vols. imp. 4to, Leipsic, 1866); and A. Van der Linde, "The Haarlem Legend of the Invention of Printing" (8vo, London, 1871). Panzer's *Annales Typographici* (12 vols. fol., Nuremberg, 1793–1809) contains the titles of nearly every known work printed in Europe to the year 1536, arranged under the names of the places where they were executed, and thus forms a condensed history of the first century of the art. Dibdin's *Bibliotheca Spenceriana* (6 vols., London, 1814–'23) gives a description of books notable for intrinsic worth or for beautiful typography printed during the 15th century. But the most complete work of this class is Brunet's *Manuel du libraire et de l'amateur de livres* (5th ed., 7 vols., Paris, 1860–'67), the result of 50 years' labor. Charles Knight's "The Old Printer and the Modern Press" (London, 1854) gives an account of the progress of the art in England, and describes the presses in use up to that date. Isaiah Thomas's "History of Printing in America" (2 vols., Worcester, 1810) gives a general view of the discovery and progress of the art, and a full account of its early period in America. On practical typography see Timperley, "Dictionary of Printers and Printing" (2d ed., London, 1842); Lefèvre, *Guide pratique du compositeur* (2 vols. 8vo, Paris, 1855); Marahrens, *Handbuch der Typographie* (2 vols. 8vo, Leipsic, 1870); and the "American Encyclopedia of Printing" (Philadelphia, 1871). (See Bibliography, Book, and Newspapers.)

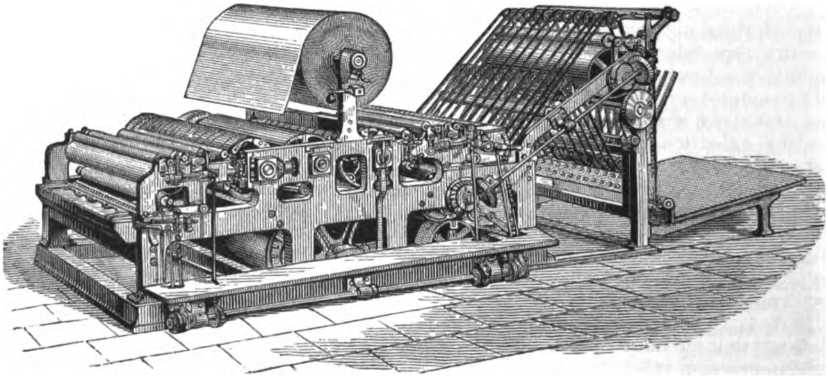


Fig. 6.—Hoe's Perfecting Press.

PRINTING, Calico. See Calico.

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